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THE VETERINARY RECORD

Founded by William Hunting, F.R.C.V.S., in 1888

Volume 72
No. 41

SATURDAY, OCTOBER 8th, 1960

7 Mansfield Street,
London, W.1.
Museum 6541

Temporary Infertility in Cattle

THE widespread development of artificial insemination has provided a previously unknown opportunity for studies on many of the factors which may be involved in bovine infertility. Where tested semen from a known fertile group of bulls is used in such a widespread manner then inseminations carried out in one group of herds can act as a control for investigations into lowered fertility in another group. It is also possible in this way to check fertility results from individual samples of semen used under such two conditions.

In this way the doubts which always exist as to a bull's fertility when he is used in a single herd, even though his semen appears to be normal, can be completely removed. This fact leaves investigators free to concentrate on the female, and at the same time to make use of the abundant information which is now available at A.I. centres.

For some years attention has been centred largely on the effects of various diseases on fertility, particularly brucellosis, vibriosis and trichomoniasis; but it has become increasingly obvious that in the great majority of cases of temporary herd infertility no known infective agent can be incriminated. It is only by surveys and research such as that reported by Boyd & Reed in this issue, and followed up by controlled experimentation, that both the infective and non-infective factors involved can be investigated. Field work of this nature can only be a pointer, and it is absolutely essential if it is to be of any real value to follow up the indications obtained in a planned experiment.

Experiments of this nature even with infective agents are of necessity expensive, but when the question of non-specific infertility is considered the problem at once becomes infinitely more difficult. The relationship of mineral requirements to fertility has been the source of endless research over many years, yet, although many factors of interest have come to light, the exact relationship of minerals to fertility is still very much in doubt. Almost all the experiments so far carried out have been on far too few cattle, yet the cost of a really worthwhile experiment is so prohibitive that experiments have of necessity been limited.

Despite the cost of such experimentation, it can only represent a very small fraction of the annual losses incurred by farmers through temporary infertility.

Research into methods of improving male fertility have been greatly spurred by the A.I. movement, but this aspect is of limited value. No bull ever constantly obtains a conception rate of more than about 75 per cent. to a single service, and the limiting factor is quite obviously the female; yet the conception rate to a second service on such females differs little from that of the first. It is quite obvious, therefore, that in the vast majority of cases failure of the development of pregnancy is due to some very temporary factor.

During recent years a little more light has been thrown on possible causes of such failure.

Provided the bull is of normal fertility there is little doubt that a very high proportion of the ova shed are fertilised, probably 90 to 95 per cent., but the importance of the hazards of their transport through the fallopian tubes has only been recognised relatively recently. It is now known, for example, that in the sheep if a fertilised ovum in the 2-cell stage of division is removed from the fallopian tube and placed in the uterus of the ewe, then it seldom, if ever, continues to develop. Similarly, if ova which have divided to the 4-cell stage, and are already about two-thirds of the way down the fallopian tube are removed and placed in the uterus, then only about 15 per cent. continue to develop into lambs. In contrast, if an 8-cell ovum which is about ready to enter the uterus is removed, and placed there directly, then about 80 per cent. of such ova will develop into lambs. These findings indicate that any factor which interferes with the normal movement and timing of entry of the egg into the uterus might also interfere with conception; moreover, such influences may well be of a temporary nature, and fit into the picture of our present knowledge of infertility. Certain hormones are known to affect the rate of movement of the egg, even in very small quantities. Somewhat similar hormones are to be found at certain times of the year in pastures, and to persist in hay or silage made from such pastures.

There is also some suggestion that mineral intake may influence the susceptibility of animals to uterine infection which again is extremely likely to be an

(*Concluded at foot of page overleaf*)

Investigation Into the Incidence and Causes of Infertility in Dairy Cattle. *Brucella abortus* and *Vibrio fetus* Infections

BY

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AND

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SUMMARY.—In this article, the results of a field study of brucellosis and vibriosis are presented. This work forms part of an investigation into factors affecting fertility in dairy herds served by two artificial insemination centres in south-west England.

Br. abortus Infection. *Individual milk samples were taken from 3,935 cows in 177 Friesian herds. The incidence of ring positive reactions was 5·4 per cent. of 1,166 at Dartington Hall and 4·7 per cent. of 2,769 samples in Somerset. There were 2 (0·2 per cent.) whey positive reactors at Dartington Hall and 42 (1·5 per cent.) in Somerset. Of 2,670 vaginal mucus samples collected in Somerset, 23 (0·9 per cent.) were positive with the vaginal mucus agglutination test for* Br. abortus.

The ring test was influenced by various factors other than infection. The two most important were the stage in gestation at time of sampling and the use of S19. Samples taken in the second half of gestation gave a higher incidence of apparently non-specific reactions. S19 vaccination, particularly in adults, was also associated with a higher incidence of positive reactors. Samples taken in the first week after calving had a higher incidence of positive reactions, presumably due to the presence of colostrum.

The whey agglutination test was affected to a lesser extent than the ring test by gestation stage and S19. The vaginal mucus agglutination test for Br. abortus *appeared to be less affected by extrinsic factors.*

In Somerset the herds were divided into infected and non-infected on the basis of herd history and the clinical tests used. The effect of brucellosis on fertility was studied. Fertility measurements were made for the gestation prior to and concurrent with sampling. Infected herds had poorer conception rate than the non-infected ones. Within the infected herds the positive individuals had poorer fertility than the non-reactors, but these differences were not significant. In Dartington it was not possible to classify the herds into infected and non-infected as in Somerset, but if the stage in gestation was taken into account, the same infertility effect as in Somerset was seen in both herds and individuals. Brucellosis did not appear to affect the insemination intervals at either centre.

V. fetus Infection. *The incidence of positive reactors with the vaginal mucus agglutination test was 5·7 per cent. of 1,605 samples and 5·3 per cent. of 677 samples in two rounds of sampling in the Dartington area; in Somerset it was 2·7 per cent. of 2,682 samples. In Dartington practically all positive reactors had been served naturally. In the whole material at both centres, only 0·9 per cent. of the positive reactors had been serviced by artificial insemination exclusively. It is suggested that these are sporadic reactions as there was no significant fertility difference between positive and negative individuals and no other suggestion of vibriosis was present.*

Temporary Infertility in Cattle.—*Concluded.*

indirect hormonal influence. The corpus luteum is known to play an extremely important part in the susceptibility of the uterus to infection, and is equally well known to have a great influence on the movement of ova down the fallopian tube; and the possible indirect action of minerals may provide an indication of their mode of action in infertility.

The complexity of the problem is so great, and the numbers of research workers involved in attempting to solve it so very small, that unless very much larger sums of money can be made available for controlled experiments carried out on a scale likely to produce significant results, then progress towards a solution is going to be very slow indeed. Field work now being carried out can only be a guide to lines of controlled work to be undertaken.

IN July 1955, an investigation into variations in fertility in herds attached to the Dartington Hall Cattle Breeding Centre was begun. This was extended to Somerset Cattle Breeding Centre in June, 1957. This was started as a result of unpublished analyses of data from several artificial insemination centres in the Private Centres' Group, which had shown that herd infertility was usually a temporary problem and that herds with more than 15 cows had poorer fertility than smaller herds. Other factors had been studied earlier, such as geological formation, calcium and phosphorus soil status and season (Holt, 1952) but apart from a possible correlation between very high rainfall and good fertility, no reasons for herd problems were elucidated.

The aims of the present investigation were to determine the course of infertility in a typical group of herds under field conditions and to examine associated environmental and infectious factors. A study of the literature (*e.g.* Laing, 1955) indicated

that the infectious agents most likely to be present were *Vibrio fetus* and *Brucella abortus*, both of which could be readily studied by diagnostic tests which could be easily applied on a large scale in the field. In the case of *Br. abortus* the possibility of an eradication scheme sometime in the future was borne in mind. Accordingly the work was planned so that information regarding incidence and suitability of the tests under field conditions could be obtained.

The work will be presented in the following sections :—

Part I. ***Brucella abortus*** **Infection**

Introduction
Material
Methods
Results
- Incidence.
- Interrelation of the tests.
- Factors affecting the ring test.
- Effect of infection on fertility.
- Incidence of abortions and stillbirths.
- Individual ring test as a herd test.

Part II. ***Vibrio fetus*** **Infection**

Introduction
Material
Methods
Results
- Incidence.
- Factors related to the vaginal mucus agglutination test result.
- Effect on fertility.
- Incidence of abortions and stillbirths.

Discussion of Both Infections

Part I. *Brucella abortus* Infection

Introduction

THE preliminary work at Dartington was a pilot scheme, designed to find the incidence of *Br. abortus* infection and its relation to fertility. An essentially random sample of the largest herds were screened by the bulk milk ring test on churn samples. This revealed that 29 (38·2 per cent.) of 76 herds, which were sampled on an average of 3 occasions, gave positive reactions. Fourteen (56 per cent.) of 25 mixed herds gave bulk positive reactions compared with 15 (29 per cent.) of 51 single-breed herds. Twenty-three (43 per cent.) of the 54 herds with more than 25 cows gave positive reactions compared with 6 (27 per cent.) of 22 smaller herds. S19 policy also affected the incidence of positive herds. Of 44 herds using calfhood vaccination 13 (30 per cent.) were positive compared with 5 (63 per cent.) of 8 using adult vaccination.

Individual milk samples were taken from the bulk positive herds and 11 bulk negative control herds for the ring test. Positive reactors had a conception rate of 48·8 per cent. of 215 inseminations compared with 56·4 per cent. of 983 inseminations for the negative animals.

It was not practicable to analyse the data in greater detail because of the variables (6 breeds and 3 centres), which had to be taken into account. Moreover, one of the effects of the material being essentially a random sample was that a number of the herds had very poor records and could not supply reliable data except of the most elementary sort. It did seem, however, that the difference in fertility between the positive and negative individuals was sufficiently great and consistent to justify further study of the effect of brucellosis in a more homogeneous group of herds. It was felt that this would also provide more scope for assessing factors related to the tests used which would be of value in later field work. Accordingly the work to be described in this article was initiated at Dartington Hall and Somerset Cattle Breeding Centres.

Material

Dartington Hall. 1,166 Friesian cows in 75 herds of 15 or more cows and heifers of breeding age, using artificial insemination only, were sampled in autumn, 1957. The material was a complete sample of the herds in this category.

Somerset. 2,769 cows in 102 Friesian herds were sampled during the winter and spring of 1957–8. Only milk recorded Friesian herds with more than 20 cows and heifers of breeding age from 4 sub-centres were selected. The majority of herds used artificial insemination only, but owing to the prevalent practice in the area of running a bull with the heifers, a number of herds using a bull on heifers only was included. An extensive outbreak of foot-and-mouth disease occurred in spring, 1958, which unfortunately forced some herds to use natural service entirely for a short period.

Methods

The main test used was the *Br. abortus* milk ring test first described by Fleischhauer (1937) and used extensively in the field as a herd test by Roepke (1950) and others. The whey tube agglutination test (M'Fadyean & Stockman, 1909 ; Cameron, 1957) was carried out on ring positive samples. The vaginal mucus agglutination test (Jepsen & Vindekilde, 1951 ; Kerr, 1955) was used on all animals in Somerset only. The milk ring and whey tube agglutination tests, as described by Ogonowski and McDiarmid (1954), were carried out at the local Ministry of Agriculture, Fisheries and Food, Veterinary Investigation Centres, at Starcross, Devon, and Langford, Bristol. Methods of reading the milk ring test differed at the 2 centres. At Starcross the classification was the usual one, *viz.* negative (white cream ring, blue milk), ± (ring slightly bluer than milk), + (blue ring, blue milk), ++ (blue ring, slightly blue milk) and +++ (blue ring, white milk). The result of the ring test is influenced by a number of factors but a ++ result indicated that the milk contained 50 International Units per ml. of *Br. abortus* antibody or over, a + result about 25 International Units per ml. At Langford the results were reported as negative (identical with negative and ± at Starcross), indefinite (identical with + and ++ at Starcross) and positive (identical with +++ at Starcross). Whey agglutination titres of 1 : 10 (equivalent to 20 International Units per ml.) were regarded as positive. Samples were

taken from all cows in milk, care being taken to avoid quarters affected by mastitis (Holm *et al.*, 1950). The vaginal mucus agglutination test was carried out at the Ministry of Agriculture, Fisheries and Food, Central Veterinary Laboratories, Weybridge. The results were given as positive and negative. The vaginal mucus was collected by pipette (Pierce, 1947) and account was taken of samples collected during oestrus.

Fertility was measured by conception rate and by the incidence of " normal " and " abnormal " intervals between inseminations. An index of conception rate was calculated as the percentage of successful inseminations measured by calving or abortion. When an animal required more than five inseminations those above 5 were ignored in order to avoid distortion of the figures by a few individuals. 18 to 24 days and 36 to 48 days, representing single and double oestrous cycles, were classified as normal insemination intervals (Asdell, 1946). Under 18 days, 25 to 35 days and over 48 days were regarded as abnormal intervals. Conception rates have been considered for 2 gestations, the one concurrent with sampling and the one prior to it. The conception rate for the previous gestation was necessarily better than for the current, since all animals must have calved to be in milk at the time sampled. An abortion was defined as any foetus known to be born before 261 days of pregnancy.

Results

Incidence

Table I shows that 63 (5·4 per cent.) cows gave a positive milk ring test reaction (one + and above) in Dartington compared with 129 (4·7 per cent.) in Somerset. A notable feature was the absence of +++ at Dartington whereas there were 37 (1·3 per cent.) in Somerset. This partly explains why there were only 2 positive whey agglutination test reactors at Dartington compared with 42 in Somerset.

Forty-three (3·7 per cent.) gave a ± reaction at Dartington. This level of reaction was recorded as negative in Somerset.

When the milk ring test results were examined on a herd basis, 48 per cent. of the herds were positive in Dartington and 60 per cent. in Somerset. Corresponding figures for the whey test were 3 and 26 per cent. These figures indicate that most herds gave only an isolated reaction as is also shown in Table III.

Only 23 (0·9 per cent.) out of 2,670 animals gave a positive reaction to the vaginal mucus agglutination test. The herd incidence of vaginal mucus positives was 10 per cent.

Interrelation of the Tests (Somerset)

Table II shows that 42 (32·6 per cent.) of the ring positive samples gave a titre of more than 1 : 10 to the whey agglutination test. In Table IV the relationship of the ring and vaginal mucus agglutination tests is considered. Only 11 animals (6 positive and 5 indefinite ring reactors) were positive to both tests. Ten of these also gave a positive whey titre of 1 : 10 or more. Milk samples from 9 of these 10, on culture were negative for *Br. abortus*. This is an indication of the low incidence of active infection in the Somerset herds under observation.

TABLE I
INCIDENCE OF POSITIVE REACTIONS TO THE *Br. abortus* RING TEST

	Negative	±	+	++	+++	All +	Total
Dartington Hall							
Cows ...	1,060	43	42	21	0	63	1,166
Per cent.	90·9	3·7	3·6	1·8	0	5·4	100·0

	Negative (negative ±)	Indefinite (+ : ++)	Positive (+++)	All +	Total
Somerset					
Cows ...	2,640	92	37	129	2,769
Per cent.	95·3	3·3	1·3	4·7	100·0

TABLE II
INCIDENCE OF POSITIVE REACTIONS TO THE *Br. abortus* WHEY AGGLUTINATION TEST (SOMERSET)

	Negative	+1 : 10	+1 : 20	+1 : 40 and over	All +	Not tested	Total
Cows	81	17	12	13	42	6	129
Per cent.	62·8	13·2	9·3	10·1	32·6	4·7	100·0

TABLE III
INCIDENCE OF POSITIVE REACTORS TO THE RING TEST FOR *Br. abortus* ON A HERD BASIS

Number positive reactors	Number of herds			
	Dartington Hall		Somerset	
	Number	Per cent.	Number	Per cent.
None	39	52	41	40
1	17	23	34	33
2	13	17	10	10
3	4	5	5	5
4	2	3	6	6
5	—	—	3	3
6	—	—	1	1
Over 6	—	—	2	2
Total herds with positive reactors	36	48	61	60
Total ...	75	100	102	100

TABLE IV
RELATION BETWEEN RING TEST AND VAGINAL MUCUS AGGLUTINATION TEST FOR *Br. abortus* (SOMERSET)

Vaginal mucus agglutination test	Ring test				Total number vaginal mucus samples
	Negative (negative and ±)	Indefinite (+ and ++)	Positive (+++)	Not tested	
Negative ...	2,373	78	27	169	2,647
Positive ...	11	5	6	1	23
Not tested ...	256	9	4	—	269
Total number milk samples	2,640	92	37	170	2,939

Factors Affecting the Ring Test

The ring test is known to be influenced by various factors. The factors considered in this paper were S19 infection ; stage in lactation and gestation at time of sampling ; and the interrelation of these factors.

S19 Vaccination

It has been widely shown that S19 vaccination can interfere with the results of the milk ring test, *e.g.* McDiarmid *et al.* (1958), and the whey agglutination test (see Kerr *et al.*, 1958) causing considerable trouble in evaluation of positive reactions.

S19 has been used extensively in the herds under investigation as detailed in Table V.

TABLE V
INCIDENCE OF S19 VACCINATION

DARTINGTON HALL

	S19 vaccination				
	Calfhood	Adult	None	Unknown	Total
Cows ...	456	198	227	285	1,166
Per cent.	39·1	17·0	19·5	24·4	100·0

SOMERSET

	S19 vaccination					
	Calfhood	Adult	Multiple	None	Unknown	Total
Cows ...	1,745	147	241	307	329	2,769
Per cent.	63·0	5·3	8·7	11·1	11·9	100·0

The results in Table VI show that adult vaccination was associated with a higher incidence of ring test positives. At Dartington the incidence of these among adult vaccinated animals was 9·6 per cent. compared with 1·8 per cent. for non-vaccinated animals. The corresponding figures in Somerset for adult and multiple vaccination were 10·9 per cent. and 12·0 per cent. respectively compared with 2·6 per cent. for non-vaccinated animals. These differences were significant. ($P < 0.01$ for both Dartington Hall and Somerset.)

Infection

Somerset. As it is common practice to vaccinate the adults in a herd following confirmation of infection, it seemed desirable to find the farmers' reasons for using adult vaccination, and whether it preceded or followed field infection. The reasons for adult vaccination are set out in Table VII. Seven (26 per cent.) used adult vaccination following confirmation of *Br. abortus* infection by their veterinary surgeons (columns 1 and 2). A further 10 (37 per cent.) used it after an abortion which was either negative or not tested (columns 3 and 4). Only 5 (19 per cent.) employed it as a precautionary routine (column 6).

An attempt was made to classify herds into infected and non-infected groups, diagnosis being based on the farm records and the farmers' history of infection from 1951 onwards. The latter was checked and confirmed where possible at the Veterinary Investigation Centre, Langford. These results were then co-ordinated with the test results before a final classification was made. From this classification there appeared to be 10 herds with a history of *Br. abortus* infection (Table VII, columns 1 and 2 ; and Table VIII). The incidence of positive ring reactions in these herds was 15·6 per cent. compared with 3·5 per cent. in the non-infected herds. The difference in incidence between infected and non-infected herds was highly significant ($P < 0.001$). The corresponding figure for the whey agglutination test was 7·0 per cent. Of the 13 positive whey titres 1 : 40 or over in the data, 11 came from these 10 infected herds. 7·5 per cent. of the vaginal mucus samples from these herds gave positive reactions.

Dartington Hall. Here an attempt was made, as in Somerset, to classify the herds into infected and non-infected groups on the basis of clinical history

TABLE VI
RELATIONSHIP BETWEEN S19 VACCINATION AND RING TEST REACTIONS

	Per cent. of ring test reactions	S19 vaccination				
		Calfhood	Adult	Multiple	None	Unknown
Dartington Hall	Negative	91·9	80·8		97·8	90·9
	±	2·6	9·6		0·4	3·9
	+	4·2	6·6		0·9	2·8
	++	1·3	3·0		0·9	2·5
	+++	—	—		—	—
	All positive	5·5	9·6		1·8	5·3
	Total	100·0	100·0		100·0	100·0
Somerset	Negative (negative and ±)	96·8	89·1	88·0	97·4	93·9
	Indefinite (+ and ++) ...	2·3	6·1	10·4	1·3	4·3
	Positive (+++)	0·9	4·8	1·7	1·3	1·8
	All positive	3·2	10·9	12·0	2·6	6·1
	Total	100·0	100·0	100·0	100·0	100·0

TABLE VII

CLASSIFICATION OF HERDS BASED ON ADULT S19 USAGE AND INFECTION (SOMERSET)

S19 policy prior to use of adult S19	Reasons for the use of adult S19						Total
	Diagnosed *Br. abortus* infection		Precautionary				
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	
	Adult S19 before and after positive abortion	Adult S19 after positive abortion	After abortion but not tested	After abortion which was negative	New herd or several animals bought in	Routine (usually on practitioner's advice)	
Calfhood	Herd No. 88 + (Sept., 1957)	Herd No. 18 +• (Mar., 1956) Herd No. 52 +• (July, 1955) Herd No. 64 +• (June, 1955) Herd No. 101 + (1954)	Herd No. 63 + Herd No. 70 +	Herd No. 22 Herd No. 34 Herd No. 45 + Herd No. 49 Herd No. 68 + Herd No. 90 +	Herd No. 10 +	Herd No. 8 + Herd No. 25 + Herd No. 74 Herd No. 91 +•	18
Irregular	Herd No. 94 + (Dec., 1956)	Herd No. 92 + (June, 1955)	Herd No. 102 +		Herd No. 82 • Herd No. 86 • Herd No. 95 +		6
None ...				Herd No. 2 +	Herd No. 7 +	Herd No. 46 +	3
Total ...	2 (7 per cent.)	5 (19 per cent.)	3 (11 per cent.)	7 (26 per cent.)	5 (19 per cent.)	5 (19 per cent.)	27 (100 per cent.)

Key : + Denotes ring positive. • Denotes vaginal mucus positive. Date denotes when infection first confirmed.

and data from samples sent in by local veterinary surgeons to the Veterinary Investigation Centre, Starcross. The fact that there were only 2 (1·9 per cent.) whey positive reactions among the 63 milk ring positives indicated that the level of infection was lower than in the Somerset material. Furthermore, only 1 herd owner claimed that adult vaccination was employed because of an abortion diagnosed as being due to *Br. abortus* infection. This occurred 4 years earlier.

Examinations of the relevant Veterinary Investigation Centre records for the period 1955–8 revealed that only 15 foetuses had been examined but all were negative on culture for *Br. abortus*. Ninety-one blood agglutination tests from 43 herds gave 14 animals in 11 herds with titres of 1 : 40 (80 International Units per ml.) or over, the majority being 1 : 40 and 1 : 80. There was a history of adult vaccination prior to sampling in 3 of the 11 herds. There was no other indication of clinical infection such as a high incidence of ring or whey positives or a high abortion rate. Therefore, on the information available, the Dartington herds could not be classified into infected and non-infected, but it did seem likely that there was some sporadic *Br. abortus* infection present. This is indicated by the correlation to be shown below between positive milk reactions and poor fertility and abortions.

TABLE VIII

CLASSIFICATION OF HERDS BASED ON INFECTION WHERE ADULT S19 WAS NOT USED (SOMERSET)

S19 policy	Diagnosed *Br. abortus* infection	*Br. abortus* infection absent	Total
Calfhood	Herd No. 41 + • (1956)	40 herds (+ for 23 • for 1)	41
Irregular	Herd No. 93 + • (Oct., 1957)	25 herds (+ for 12)	26
None ...	Herd No. 35 + • (Aug., 1956)	7 herds (+ for 2)	8
Total	3 (4 per cent.)	72 (96 per cent.)	75 (100 per cent.)

Key : + Denotes ring positive.
• Denotes vaginal mucus positive.
Date denotes when infection first confirmed.

Stage in Lactation and Gestation at Time of Sampling

Some workers have stated that care should be exercised when interpreting the whey agglutination test of milk sampled in late lactation (Bruhn, 1948 ; Kerr *et al.*, 1958). Kerr and his co-workers consider that some of the reactions obtained at this time are due to serum globulins in the milk. The ring test results were analysed according to the number of months after calving (Table IX). From the seventh month onwards there was a marked rise in the incidence of positive reactions, an effect which occurred at both centres (Fig. 1). The reactions were then classified according to the stage of gestation (Table X). The incidence of ring positives increased from 1·6 per cent. in the fourth month of gestation to about 20 per cent. in the last 3 months of gestation. This rise was noted at both centres (Fig. 2) and was highly significant ($P < 0.001$). It was then necessary to find out which of the factors, lactation or gestation,

was stronger. Table XI shows the effect of lactation in non-pregnant animals. It can be seen that although there was a slight rise at the sixth month of lactation this fell away again after the ninth month. Together with the figures in Tables IX and X, it would seem that gestation had a greater effect on the ring test than had lactation.

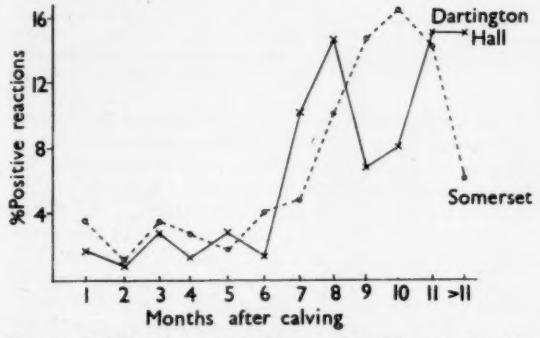

FIG. 1.—Relation between incidence of positives to ring test and lactation stage.

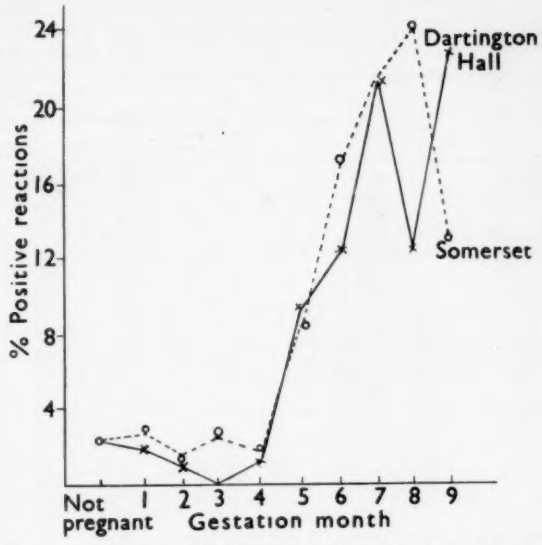

FIG. 2.—Relation between incidence of positives to ring test and gestation stage.

Because of the high concentration of lacto-globulin in colostrum (Pierce, 1955), it might be expected that the incidence of positive reactions would be high during the first few days after calving. Holm *et al.* (1950) have reported this to be so and the same effect has been observed in our material (Table XII). The incidence of positive reactions in the first 7 days *post partum* was 8·4 per cent. compared with 1·2 per cent. for the rest of the first month.

Relationship Between S19, Stage in Gestation, Infection and the Milk Ring Test

The relative influence of these 3 factors affecting the ring test is shown in Table XIII (Dartington Hall, no infection classification), Table XIV (Somerset) and Fig. 3 (both centres). The tables and histogram show that even when the material is divided into sub-groups the results are consistent with the findings in the primary tables relating to S19 (Table VI) and gestation stage (Table X). In Somerset the further sub-division according to infection shows that in the non-infected group the effect of gestation is stronger than that of vaccination. This brings out the important point that animals in non-infected herds sampled in the second half of gestation had essentially the same incidence of positive reactions as animals in infected herds sampled up to the fourth month of gestation. That the effect of S19 vaccination is less than that of gestation is shown by the low incidence (4·3 per cent.) of positive reactions in adult vaccinated animals sampled up to the fourth month of pregnancy in

TABLE IX

RELATION OF STAGE IN LACTATION WITH THE RING TEST (DARTINGTON HALL AND SOMERSET)

	Months after calving													Total
	1	2	3	4	5	6	7	8	9	10	11	Over 11	Unknown	
Total	462	499	493	435	354	346	319	310	187	207	128	162	33	3,935
Number positive	12	5	15	10	7	10	19	33	20	26	19	15	1	192
Per cent. positive	2·6	1·0	3·0	2·3	2·0	2·9	6·0	10·6	10·7	12·6	14·8	9·3	3·0	4·9

TABLE X

RELATION OF STAGE IN GESTATION WITH THE RING TEST (DARTINGTON HALL AND SOMERSET)

	Animals not pregnant at time sampled	Gestation month										Total
		1	2	3	4	5	6	7	8	9	Unknown	
Total	1,921	405	281	272	255	296	197	162	97	32	17	3,935
Number positive	53	11	5	6	4	25	29	34	19	6	—	192
Per cent. positive	2·8	2·7	1·8	2·2	1·6	8·4	14·7	21·0	19·6	18·8	0·0	4·9

TABLE XI

RELATION OF STAGE IN LACTATION WITH THE RING TEST RESULTS IN NON-PREGNANT ANIMALS (DARTINGTON HALL AND SOMERSET)

	Months after calving													Total
	1	2	3	4	5	6	7	8	9	10	11	Over 11	Unknown	
Total	460	463	359	187	113	73	57	59	24	45	19	44	18	1,921
Number positive	12	4	12	7	3	4	3	5	2	—	—	1	—	53
Per cent. positive	2·6	0·9	3·3	3·7	2·7	5·5	5·3	8·5	8·3	0·0	0·0	2·3	0·0	2·8

TABLE XII

EFFECT OF THE CALVING SAMPLING INTERVAL ON THE RING TEST WITHIN THE FIRST MONTH (DARTINGTON HALL AND SOMERSET)

	Days after calving					Total
	1–7	8–14	15–21	22–31	Unknown	
Total ...	95	107	79	149	32	462
Number positive	8	—	2	2	—	12
Per cent. positive	8·4	0·0	2·5	1·3	0·0	2·6

non-infected herds. As would be expected the lowest incidence (0·8 per cent.) of positive reactions occurred in the non-vaccinated animals in the same group. It may be noted that one of the 2 positive animals in this category was sampled 4 days after calving. The effect of gestation is less in the infected than in the non-infected group. In the infected herds, however, the incidence of positive reactors sampled in the second half of pregnancy was 25·8 per cent., more than twice that of those sampled up to the fourth month of gestation. The relatively low figure (6·3 per cent.) for the calfhood vaccinated animals in the infected herds sampled up to the fourth month of pregnancy, may be an indication of the value of regular calfhood vaccination.

TABLE XIII

INCIDENCE OF RING TEST REACTIONS RELATED TO STAGE OF GESTATION AND USE OF S19 (DARTINGTON HALL)

S19	Not over 4 months gestation					Over 4 months gestation				
	Total	±		Positive		Total	±		Positive	
		Number	Per cent.	Number	Per cent.		Number	Per cent.	Number	Per cent.
Calfhood ...	326	5	1·5	7	2·1	130	7	5·4	18	13·8
Adult ...	137	10	7·3	7	5·1	61	9	14·8	12	19·7
None ...	175	0	0·0	1	0·6	52	1	1·9	3	5·8
Unknown ...	211	3	1·4	4	1·9	74	8	10·8	11	14·9
Total ...	849	18	2·1	19	2·2	317	25	7·9	44	13·9

TABLE XIV

INCIDENCE OF MILK RING TEST REACTIONS RELATED TO STAGE OF GESTATION S19 AND INFECTION (SOMERSET)

Classification of infection	S19	Not over 4 months gestation			Over 4 months gestation		
		Total	Number positive	Per cent. positive	Total	Number positive	Per cent. positive
Br. abortus infected herds	Calfhood ...	64	4	6·3	12	3	25·0
	Adult ...	92	14	15·2	38	10	26·3
	None ...	9	2	22·2	5	1	20·0
	Unknown ...	29	4	13·8	7	2	28·6
	Total ...	194	24	12·4	62	16	25·8
Non-infected herds	Calfhood ...	1,408	17	1·2	261	32	12·3
	Adult ...	208	9	4·3	50	12	24·0
	None ...	241	2	0·8	52	3	5·8
	Unknown ...	251	8	3·2	42	6	14·3
	Total ...	2,108	36	1·7	405	53	13·1

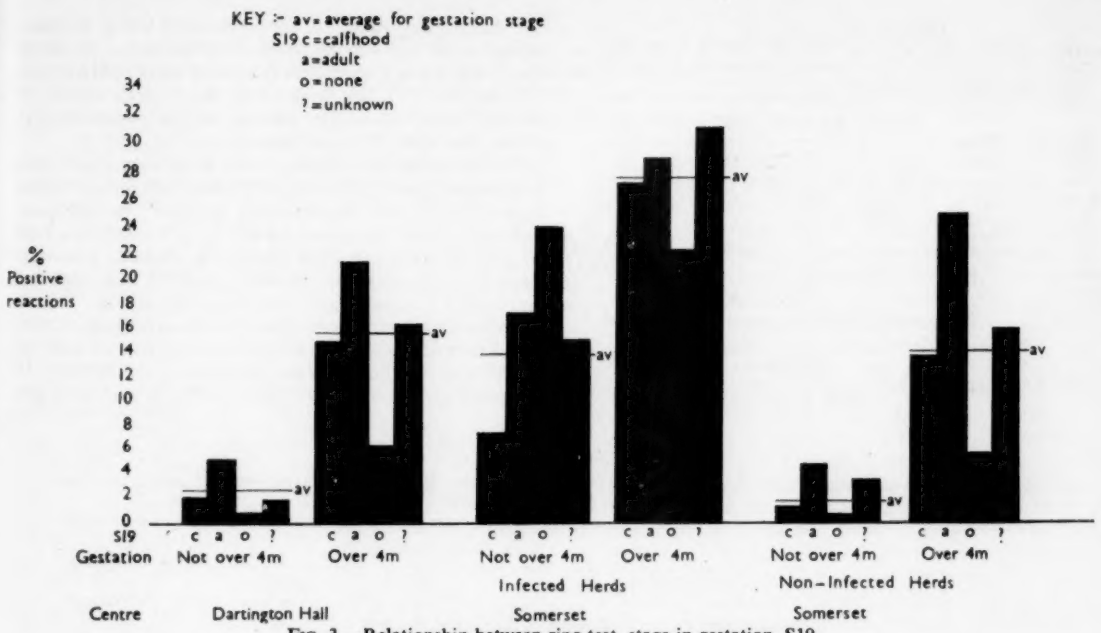

FIG. 3.—Relationship between ring test, stage in gestation, S19 and infection.

Relationship Between the Whey Agglutination Test, Ring Test and Stage in Gestation

In Table XV the whey agglutination test appears to be less affected by the stage of gestation than the ring test. In the whey negative animals there were only 30 (52·6 per cent.) of 57 animals sampled up to the fourth month of pregnancy. The corresponding figure for those sampled over 4 months pregnant was 51 (77·3 per cent.) out of 66 animals.

TABLE XV

RELATION BETWEEN THE WHEY AGGLUTINATION TEST, RING TEST AND STAGE IN GESTATION (SOMERSET)

Whey titre	Gestation stage										
	Not over 4 months. Ring test					Over 4 months. Ring test					Total
	Negative (negative and ±)	Indefinite (+ and ++)	Positive (+++)	Total +	Per cent. +	Negative (negative and ±)	Indefinite (+ and ++)	Positive (+++)	Total +	Per cent. +	
Negative ...	—	24	6	30	52·6	—	37	14	51	77·3	81
+ 1 : 10 ...	—	8	3	11	19·3	—	4	2	6	9·1	17
+ 1 : 20 ...	—	4	3	7	12·3	—	3	2	5	7·6	12
+ 1 : 40 and over	—	3	6	9	15·8	—	3	1	4	6·1	13
Total whey tested	—	39	18	57	100·0	—	47	19	66	100·0	123
Not tested ...	2,242	3	—	3		398	3	—	3		2,646

When the gestation effect was taken into account it seemed that the strength of the ring test was approximately proportional to the strength of the whey titres.

The Effect of Infection on Fertility

Conception Rate

Infertility has been associated with ring positive reactors by Hendrikse *et al.* (1953), and with positive plate agglutination reactors by the New Zealand Dairy Board (1957). When measuring the fertility of ring positive and negative animals it was necessary to take into account the factors which affected the test (Tables XVI and XVII).

In Table XVI (Dartington) it can be seen that animals sampled up to the fourth month of gestation showed a difference in conception rate between negative and positive reactors, from 60·5 to 44·7 per cent. in the previous gestation and from 49·0 to 42·9 per cent. in the current gestation. There was also a fertility difference between negative and ± reactors. Those animals sampled over 4 months pregnant did not show any consistent difference in conception rate between negative and positive animals. As the proportion of presumably non-specific ring positive reactions was high in this group, this was the result that would be expected. One exception, not shown in

TABLE XVI
RELATION OF CONCEPTION RATE WITH *Br. abortus* RING TEST REACTIONS, TAKING THE EFFECT OF THE GESTATION STAGE ON THE RING TEST INTO ACCOUNT (DARTINGTON HALL)

Gestation stage	Ring test	Previous gestation AI	Previous gestation CR	Current gestation AI	Current gestation CR
Nor over 4 months gestation	−	1,231	60·5	1,260	49·0
	±	28	53·6	32	21·9
	Positive	38	44·7	28	42·9
Over 4 months gestation	−	389	54·8	426	57·7
	±	41	51·2	40	62·5
	Positive	68	52·9	75	57·3

AI = Number of inseminations.

$$CR = \text{Conception rate} = \frac{\text{pregnancies}}{\text{total inseminations}} \times 100.$$

the table, appeared in the non-vaccinated animals sampled in the second half of gestation. In these there was a low conception rate in positive individuals. This agrees with the theory that the high incidence of positive reactions in the second half of gestation was associated with S19 vaccination.

In Table XVII (Somerset) the infertility effect was even more strongly demonstrated by the sub-division into infected and non-infected groups. In the non-infected group there was no effect on conception rate in the previous gestation and in the current gestation only a small difference between positive and negative (including ±) animals sampled up to the fourth month of gestation. In the infected group, however, the difference was considerable irrespective of time of sampling. In the previous gestation the difference in conception rate was 14·7 per cent. (63·6 and 48·9 per

TABLE XVII
RELATION OF CONCEPTION RATE WITH *Br. abortus* RING TEST REACTIONS, TAKING INTO ACCOUNT FACTORS AFFECTING THE RING TEST (SOMERSET)

Classification of infection	S19	Previous gestation: Not over 4 months gestation, Ring negative AI	CR	Ring positive AI	CR	Over 4 months gestation, Ring negative AI	CR	Ring positive AI	CR	Total AI	CR
Br. abortus infected herds	Calfhood	83	63·9	6	66·7	4	75·0	2	50·0	95	64·2
	Adult	120	64·2	28	46·4	37	73·0	23	39·1	208	60·6
	None	10	70·0	4	50·0	6	50·0	2	50·0	22	59·1
	Unknown	40	60·0	7	42·9	6	83·3	2	100·0	55	61·8
	Total	253	63·6	45	48·9	53	71·7	29	44·8	380	61·6
Non-infected herds	Calfhood	1,893	68·9	22	68·2	310	61·6	47	63·8	2,272	67·8
	Adult	272	67·3	9	88·9	53	60·4	20	55·0	354	66·1
	None	318	69·8	5	40·0	66	62·1	7	42·9	396	67·7
	Unknown	324	64·2	10	80·0	49	51·0	8	62·5	391	62·9
	Total	2,807	68·3	46	71·7	478	60·5	82	59·8	3,413	67·1
Total		3,060	67·9	91	60·4	531	61·6	111	55·9	3,793	66·5

Classification of infection	S19	Current gestation: Not over 4 months gestation, Ring negative AI	CR	Ring positive AI	CR	Over 4 months gestation, Ring negative AI	CR	Ring positive AI	CR	Total AI	CR
Br. abortus infected herds	Calfhood	109	49·5	13	23·1	9	100·0	3	100·0	134	51·5
	Adult	146	46·6	31	35·5	33	84·8	18	55·6	228	51·3
	None	7	100·0	1	100·0	5	80·0	1	100·0	14	92·9
	Unknown	37	54·1	6	50·0	6	83·3	2	100·0	51	58·8
	Total	299	49·8	51	35·3	53	86·8	24	66·7	427	53·6
Non-infected herds	Calfhood	2,065	56·0	29	48·3	333	68·2	53	60·4	2,480	57·7
	Adult	326	48·5	17	47·1	56	67·9	16	75·0	415	52·0
	None	328	54·6	1	100·0	84	58·3	5	60·0	418	55·5
	Unknown	360	53·6	15	46·7	54	66·7	6	100·0	435	55·6
	Total	3,079	54·8	62	48·4	527	66·4	80	66·2	3,748	56·6
Total		3,378	54·4	113	42·5	580	68·3	104	66·3	4,175	56·3

AI = Number of inseminations. $CR = \text{Conception rate} = \frac{\text{pregnancies}}{\text{total inseminations}} \times 100.$

cent.), and 26·9 per cent. (71·7 and 44·8 per cent.) in the 2 pregnancy stage groups. In the current pregnancy, the differences were 14·5 per cent. (49·8 and 35·3 per cent.) and 20·1 per cent. (86·8 and 66·7 per cent.) respectively. Similar differences within the S19 sub-groups were reasonably consistent. However, the number of ring positive animals involved was small and the fertility differences were not statistically significant.

TABLE XVIII

RELATION OF CONCEPTION RATE WITH VAGINAL MUCUS AGGLUTINATION TEST (SOMERSET)

Classification of infection	Animals	Previous gestation		Current gestation	
		AI	CR	AI	CR
Br. abortus infected herds	Mucus −	321	61·4	383	52·0
	Mucus +	32	53·1	34	41·2
	Total	353	60·6	417	51·1
Non-infected herds	Mucus −	3,291	66·7	3,620	56·6
	Mucus +	5	100·0	11	27·3
	Total	3,296	66·8	3,631	56·5

AI = Number of inseminations.

$$\text{CR} = \text{Conception rate} = \frac{\text{pregnancies}}{\text{total inseminations}} \times 100.$$

Table XVIII shows the relation of vaginal mucus agglutination test results and conception rates in Somerset. Mucus positive animals in the infected herds again had poorer conception rates than the negative animals, the difference being 8·3 and 10·8 per cent. for the 2 gestations. In the non-infected herds the positive reactors had a conception rate of 100 per cent. in the previous gestation, but there were only 5 animals in the group, 3 of which had been bought in within 3 years of sampling. In the current gestation the conception rate of the positive reactors was 29·3 per cent. lower than the negative reactors.

The incidence of ring positives was not greatly affected by the age of the animals sampled. In Table XIX (Dartington Hall and Somerset) the relation between milk ring test, age and conception rate is given. There was a general deterioration of conception rate with age. The conception rate of ring positive first calvers was low in both gestations in which conception rates were calculated. In other work in this investigation certain factors have been shown to be definitely associated with lower fertility, *e.g.* calving service interval and age of semen (Boyd & Reed). To ascertain whether these factors had any undue effect on the present results, the figures in Somerset were re-analysed taking into account only those animals which were inseminated under conditions not associated with lower fertility. A consistent result, similar to that in Table XVII was still obtained although the numbers by necessity were much smaller.

TABLE XIX

RELATION OF CONCEPTION RATE WITH AGE AND RING TEST (DARTINGTON HALL AND SOMERSET)

Age (number calves prior to sampling)	Previous gestation				Current gestation			
	Ring negative		Ring positive		Ring negative		Ring positive	
	AI	CR	AI	CR	AI	CR	AI	CR
Heifer	1,051	65·8	34	64·7	—	—	—	—
1	1,001	66·9	45	48·9	1,333	57·8	62	40·3
2	777	65·3	75	54·7	1,009	61·7	40	65·0
3	690	66·1	53	52·8	800	57·1	72	56·9
Over	1,480	59·3	91	56·0	2,224	49·3	139	52·5
Total	4,999	64·1	298	55·0	5,366	54·9	313	52·7

AI = Number of inseminations. $\text{CR} = \text{Conception rate} = \frac{\text{pregnancies}}{\text{total inseminations}} \times 100.$

TABLE XX

INTERVALS BETWEEN INSEMINATIONS AND RING TEST REACTIONS (DARTINGTON HALL AND SOMERSET)

Gestation	Ring test	Interval between inseminations (days)										Total	
		Less than 18		18–24		25–35		36–48		More than 48			
		Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.
Previous ...	−	63	3·5	922	50·7	170	9·3	298	16·4	367	20·2	1,820	100·0
	+	4	2·9	80	58·0	11	8·0	21	15·2	22	15·9	138	100·0
Current ...	−	82	3·6	1,064	46·2	232	10·1	395	17·1	531	23·0	2,304	100·0
	+	5	3·5	56	39·2	21	14·7	22	15·4	39	27·3	143	100·0

The Dartington Hall figures were too small to analyse in this way.

Insemination Intervals

To find out if *Br. abortus* infection was associated with regular oestrous cycles, the ring test results were related to insemination intervals (Table XX). There did not seem to be any difference between ring positive and negative animals. Factors affecting the ring test were also taken into account in the analyses of these figures but no consistent difference was apparent. The vaginal mucus agglutination test gave the same picture.

Infection and Abortions and Stillbirths

Table XXI shows the relationship between the different tests and abortions and stillbirths in the gestation prior to sampling. 14·0 and 11·7 per cent. of ring positive reactors in Dartington and Somerset respectively aborted compared with 4·2 and 2·9 per cent. for the respective negative animals. At Dartington 2 (5·5 per cent.) of 36 animals reacting ± aborted. With the vaginal mucus positive reactors the incidence of abortions was 27·3 per cent. compared with 3·0 per cent. for the negatives. All gestation lengths were calculated in days so in this way it was possible to obtain a true figure for premature calvings and abortions and not just an estimated figure obtained from the farmers, who in some cases are reluctant to reveal information of this nature.

TABLE XXI

RELATION OF THE TESTS FOR *Br. abortus* WITH ABORTIONS AND STILLBIRTH;

Test	Dartington Hall		Somerset		
	Cows	Per cent. abortions	Cows	Per cent. abortions	Per cent. stillbirths
Ring −	767	4·2	2,416	2·9	3·0
Ring +	43	14·0	120	11·7	5·8
Whey +	2	0·0	40	25·0	0·0
Vaginal mucus −	—	—	2,647	3·0	3·1
Vaginal mucus +	—	—	23	27·3	4·5

The incidence of stillbirths (Table XXI) was slightly higher amongst ring positive animals but this was not borne out by the whey agglutination test.

The Individual Ring Test as a Herd Test

The bulk milk ring test has been used extensively as a herd test (Roepke *et al.*, 1950 ; Marr & Williams, 1958). As this is a very sensitive test, which should pick out a single reactor in a herd, it seemed reasonable, therefore, to classify the herds on the basis of the individual ring results to find out if herd conception rates, as distinct from individual conception rates, were affected by brucellosis. This has been done in Dartington only because a more accurate classification of infection had already been worked out in Somerset where it had been noted that the infected herds had poorer conception rate in both gestations than the non-infected herds (Table XVII). In Dartington, the herds were classified into 3 groups. A negative group of 28 herds consisted of all those with no positive or ± ring test reactions. There was a group of 11 herds with ± reactions only and 36 herds with positive reactions. The herd conception rate for negative herds was 62·3 per cent. compared with 55·2 per cent. for positive herds in the previous gestation and 54·4 per cent. compared with 49·3 per cent. in the current gestation (Table XXII).

TABLE XXII

CONCEPTION RATE OF HERDS CLASSIFIED ACCORDING TO INDIVIDUAL RING TESTS (DARTINGTON HALL)

Classification of herds	Previous gestation		Current gestation	
	AI	CR	AI	CR
Negative ...	554	62·3	588	54·4
±	235	62·6	253	50·6
Positive ...	1,006	55·2	1,020	49·3

AI = Number of inseminations.

$$\text{CR} = \text{Conception rate} = \frac{\text{pregnancies}}{\text{total inseminations}} \times 100.$$

(To be concluded)

SOUTH AFRICAN V.M.A. CONGRESS

The 55th annual congress of the S.A.V.M.A. was held at Onderstepoort, Pretoria, on August 29th to September 2nd. The congress was opened by Dr. S. M. Raudé, President of the C.S.I.R. In his address Dr. Raudé expressed concern over the organisation and administration of scientific research in S. Africa, and suggested that the time was ripe for a fresh approach to this subject. The association was asked to give its attention and support to recent proposals for the setting up of a number of independent councils to supervise and co-ordinate research in the major scientific fields. The President, Dr. H. P. Steyn, who had been re-elected for a second year, made a similar plea in his presidential address. Dr. Steyn drew attention to the fact that veterinary research was not keeping pace with the general expansion of agriculture, and pressed for vigorous measures to improve the position.

The congress was well supported, each daily session being attended by approximately 180 veterinarians, out of a total membership of 420. The programme included two very successful social events, and the smooth running of the congress as a whole reflected considerable credit on the organisers.

MR. S. F. J. HODGMAN

His many friends in the profession and outside it will be very happy to learn that Mr. Hodgman, who recently underwent a serious surgical operation, came through this ordeal safely and is making an excellent recovery. A correspondent, to whom we are indebted for the above information, says that Mr. Hodgman is "full of beans."

Prenatal Infection of Calves with *Cysticercus bovis*

BY

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SUMMARY.—Cases of prenatal infection of calves with Cysticercus bovis *found during routine meat inspection are discussed.*

Introduction

ACCORDING to the majority of text-books and meat legislation the inspection for *Cysticercus bovis* can be omitted in calves under 6 weeks of age. This idea has had to be drastically revised in Kenya. In 1957 and 1958, 14,855 calves were slaughtered for use in the products of Uplands Bacon Factory; of the total number of calves killed, 457 were condemned for measles, *i.e.* 3.07 per cent. In 1957, 7,008 calves were slaughtered and 255 condemned for measles, *i.e.* 3.6 per cent. In 1958, 7,847 calves were slaughtered and 202 condemned for measles, *i.e.* 2.5 per cent. The ages of approximately 80 per cent. of the calves slaughtered ranged between 2 days and 21 days, the remaining calves ranged between 1 and 3 months, and there were 14 calves aged 6 months which were condemned for measles.

In the article by Ginsberg (Ginsberg, 1958) the figure of 4.5 per cent. for prenatal infection is quoted under the names of Ginsberg, Urquhart and McManus. The figures obtained from most of the calves examined in 1957 and analysed in this present paper were available to Ginsberg but not those of 1958; likewise Ginsberg had data on calves not included in this paper; hence there is a difference in the percentage incidence quoted in the two articles.

Materials and Methods

The calves were sent from many areas of the Kenya Highlands and were chiefly bull calves from dairy herds although some were sent in by beef breeders. Each batch of calves as it was off-loaded had a card made out for it which included farm number and the owner's name. Then as each batch was slaughtered the carcase received a factory serial number to identify it, the data being recorded on a printed form. Using this method it was impossible to identify any one calf in any batch with accuracy so questionnaires were sent to farmers concerning calves condemned for measles asking what ages were the calves in the batch. All ages used in Tables I and II were derived from the answers to the questionnaires.

The method of examination of the carcase for cysticerci was that laid down in the Public Health (Designated Places) Meat Inspection Rules, 1955, in Kenya. These methods have been described elsewhere (Ginsberg, 1960).

The cysts in the condemned animals usually resembled those described by Mönnig (1956) as fully developed cysticerci. In some animals a proportion of these cysts were caseated. In some cases, only immature cysts were present and these appeared as whitish nodules about 2 to 3 mm. by 1 to 2 mm. in size containing a minute quantity of fluid and in which the unarmed scolex did not show fully developed suckers.

Results

The predilection sites for *C. bovis* in the calves were found to be shoulder, tongue, heart, and masseter muscles in that order of decreasing frequency. These observations agree with those of Ginsberg *et al.* (1956) and confirm that meat inspection techniques which rely solely on incisions into the muscles of mastication are not adequate for the detection of *Cysticercus bovis.*

The calves in which cysticerci were found have been tabulated in 2 groups. Table I contains those animals aged from 2 to 10 days in which it is considered that prenatal infection must have occurred. Table II contains those calves whose age ranged from 13 to 26 days, with the exception of one calf which was possibly 34 days old, and in this group postnatal infection could have occurred. The 28 prenatal infections listed in Table I represent 0.19 per cent. of the 14,855 calves examined. It is not possible to calculate what proportion of calves under 10 days of age were infected since detailed age information was not obtained for uninfected calves of that age.

Discussion and Conclusion

Most published accounts of the size and shape of *Cysticercus bovis* begin with those of 4 weeks of development. According to Mönnig (1956) the cyst requires 18 weeks for its complete development in the bovine animal but it would be infective somewhat earlier. When fully grown the cysts measure 7.5 to 9 mm. by 5.5 mm. The scolex resembles that of the adult worm in that it has neither hooks nor rostellum. In the experimental infections reported by McIntosh (1956) there was one case recorded 11 days after infection which had small whitish nodules 2 × 3 mm. in size visible to the naked eye. Canham (1946) has reported *C. bovis* in 1 calf at 10 days old, 2 calves at 3 weeks old and 2 calves at 6 weeks old.

The earliest age at which Urquhart (personal communication) has discovered cysts visible to the naked eye is 15 days after infection.

From available knowledge, immature or small cysts found in calves older than 11 to 15 days could have arisen from postnatal infection and for this reason the list of calves included in Table I as undoubted prenatal infections comprises only animals up to 10 days of age. In Table II there are many calves having mature cysts which were almost certainly prenatal infections but since this could be disputed they have been listed separately.

In many cases in calves under 3 weeks of age caseous cysts were encountered but in only 1 animal from farm 24 was the diagnosis confirmed histo-

TABLE I

Farm	Number of calves, breed, etc.	Age—days	Incidence of C.B.* on farm
1	1 calf, V.H.G. Ayrshire—fed colostrum for one day	2	C.B. in steers
2	2 calves—not known	2	Not known
3	1 calf (1 of 2 calves), Ayrshire × Boran—suckled dam	4	C.B. in cattle
4	1 calf (1 of 2 calves), Danish Island Red × Ayrshire—bucket fed	3 or 9	No cases of C.B.
5	1 calf (1 of 2 calves), Grade Guernsey—ran with mother	5 or 8	One case of C.B. in 1956
6	1 calf, V.H.G. Ayrshire—one day with mother and 3 days on whole milk	5	Cases of C.B.
7	1 calf (1 of 2 calves), Ayrshire—housed and bucket fed	4 or 5	No cases reported
8	2 calves (2 of 4 calves), Grade Jersey—all suckled	All 5	C.B. in cattle
9	2 calves (2 of 5 calves)—H.G. Jersey, Jersey × Guernsey, Boran × Sahiwal—bucket fed	Both under 7	C.B. in cattle
10	1 calf (1 of 2 calves)—breed not known—ran with mother 5 days and then hand fed	Both 7	C.B. in cattle
11	1 calf, Grade Ayrshire—bucket fed with dam's milk	7	No cases reported
12	1 calf (1 of 4 calves), Grade Ayrshire—housed and suckled dam	Up to 7	No cases
13	1 calf (1 of 5 calves), Grade Ayrshire—housed and bucket fed	Less than 7	No cases
14	1 calf, breed not known—suckled by dam	6	No cases
15	1 calf (1 of 6 calves), Jersey × Friesian	Between 7 & 10	Cases of C.B.
16	1 calf (1 of 2 calves), Friesian—housed and bucket fed	Both under 7	No cases
17	1 calf (1 of 4 calves), Ayrshire—housed and bucket fed	All under 7	Cases of C.B.
18	1 calf (1 of 3 calves), Grade Ayrshire—suckled and housed	1 to 6	Cases of C.B.
19	1 calf, Friesian—suckled dam for first 24 hours	10	Cases of C.B.
20	1 calf (1 of 3 calves), Grade Ayrshire—housed and bucket fed	All 10	Cases of C.B. in calves only
21	1 calf (1 of 4 calves), Jersey and Friesian—suckled by dams	7 to 10	Cases of C.B.
22	1 calf, Grade Ayrshire—housed and suckled	8	No cases reported
23	3 calves, Grade Guernsey—bucket fed and housed	10	Cases of C.B.

TABLE II

Farm	Number of calves, breed, etc.	Age—days	Incidence of C.B.* on farm
24	1 calf (1 of 8 calves), Grade Ayrshire—bucket fed	7 to 14, cysts caseous	No cases reported
25	2 calves (2 of 4 calves), Grade Jersey—housed and bucket fed	Not more than 14 and one was 2 days	No cases reported
26	1 calf, Boran—bucket fed	13	Had 10% C.B. of animals slaughtered in 1956
27	1 calf (1 of 2 calves), Friesian	14	No cases reported
28	1 calf (1 of 4 calves), Grade Ayrshire—housed and bucket fed	7 to 14	No cases of C.B.
29	2 calves, Grade Guernsey—not housed and suckled by dams	14	No cases reported
30	3 calves, Grade Ayrshire—housed and bucket fed	16 to 21	C.B. in calves
31	1 calf, Ayrshire—housed and bucket fed	19	No cases reported
32	1 calf (1 of 2 calves), Grade Ayrshire—housed and bucket fed	9 or 18	No cases reported
33	4 calves, Grade Ayrshire—housed and bucket fed	19, 21, 23 & 26	C.B. in calves
34	2 calves (2 of 5 calves)	2 at 5, 1 at 7, 1 at 9, 1 at 34	No cases reported
35	1 calf, H Grade Jersey—housed and bucket fed	23	No cases reported
36	1 calf (1 of 5 calves), breed not known—housed and bucket fed	3 to 21	No cases reported
37	2 calves, breed not known	7 to 14 & 21	No cases reported

* "C.B." = *Cysticercus bovis*.

logically. In approximately 10 calves both large caseous cysts and small viable cysts were encountered in the same animal.

The data presented confirm the results of Canham (1946) who demonstrated *C. bovis* in 1 calf 10 days old, 2 calves of 3 weeks old and 2 calves at 6 weeks old.

The total incidence of cysticercosis in 14,855 calves examined during 1957 and 1958 was 3.07 per cent. Since approximately 80 per cent. of these calves were under 6 weeks of age and the incidence of cysticercus was fairly evenly distributed through all age groups, it is apparent that considerable incidence of cysticercosis occurs in calves under 6 weeks of age. The need for meat inspection legislators to recognise this fact has already been emphasised by Ginsberg (1954, 1958).

Acknowledgments.—The writer desires to express his appreciation to the Management of Uplands Bacon Factory for all facilities offered, and to Dr. Ginsberg and Dr. S. Barnett for advice and encouragement. This paper is published with the permission of the Director of Veterinary Services, Kabete.

References

CANHAM, A. S. (1946). *S. Afr. med. J.* **17**. 169.
GINSBERG, A. (1954). *Ibid.* **31**. 81.
———, CAMERON, J., GODDARD, W. B., & GRIEVE, J. M. (1956). *Bull. epiz. Dis. Afr.* **4**. 27.
———. (1960). *Vet. Rec.* **72**. 310.
———. (1958). *Bull. epiz. Dis. Afr.* **6**. 141.
MCINTOSH, A. (1956). *J. Parasit.* **42** (Section 2). 41.
MONNIG, H. O. (1956). "Veterinary Helminthology and Entomology." 4th ed. Baillière, Tindall & Cox. London.

Strontium 90 in Human Diet in the United Kingdom, 1959

STRONTIUM[90], one of the radioactive substances produced in nuclear weapon tests, contaminates grass and crops when it is deposited as fall-out; it is taken up by plants which form the first link in the food-chain destined for human consumption. Man may directly consume these plants, for example as vegetables, or they may be consumed by farm animals. In the latter case the animal products, such as milk, meat, and eggs, are themselves sources of danger to man; this aspect is of particular interest to the veterinary profession. Strontium[90] is highly dangerous since it "decays" only over a period of many years and also since it is metabolised in the body in a similar manner to calcium, being incorporated in the bones. Thus the skeleton within the body acts as an internal source of potentially dangerous radiation.

The third report* has now been published in the series dealing with contamination of human diet in the United Kingdom by strontium[90]. The report concerns the level of strontium[90] in the total diet, including dairy products, during the whole year.

Part I deals with the interpretation of the results of surveys of strontium[90] in human food; the significance of the levels of strontium[90] can only be judged in the light of medical assessments of the significance of man's exposure to radiation. The Medical Research Council is understood to be basing its assessments on the findings of the International Commission on Radiobiological Protection. The latter body has proposed a maximum permissible concentration of strontium[90] in bone for the average person in the population at large, and a maximum for individual members of the population. The results obtained in the survey are interpreted on this basis of a subject which, as readers will be aware, is of a somewhat controversial nature.

Part II describes the results of a country-wide survey to estimate the average quantity of strontium[90] in the diet of the population as a whole. The major effort was devoted to milk, samples from 200 depots being examined. Milk produced in areas of higher rainfall possessed a higher content of strontium[90]. There was appreciable increase in strontium[90] in the milk in the first part of 1959, but the level later returned to about the same as in the previous year. The values for milk bore a relationship to the amount deposited on herbage, but there were some divergencies since in the latter part of the year cattle are fed to some extent on herbage grown earlier in the season; also climatic factors play a part in the absorption of strontium[90] from the soil and its retention by plants. The report states that "it appears justified to conclude that the strontium[90] hitherto injected into the atmosphere has already exerted its major effect and that in the future the levels of strontium[90] in the milk should decline." Values for cheese were calculated on the basis of those for milk; imported cheeses have strontium[90] levels relative to the levels in milk of the country of origin, and New Zealand cheese reflected the markedly lower deposition of strontium[90] in the Southern Hemisphere. Dairy produce accounted for about 57 per cent. of the total strontium[90] in the diet; however, the ratio of strontium[90] to calcium in dairy produce differed little from the mean ratio in the total average diet. Exclusion of milk from the diet and substitution of other foods would not therefore reduce the level of strontium in bone. It is therefore some small consolation that one might as well take one's daily dose of strontium[90] in one's milk as in some other less palatable and nutritious form of food. It is noted that the survey provides no direct evidence with regard to strontium[90] in meat or fish, but values for these can be estimated and it is considered that, in view of the small contributions of both meat and fish to the total calcium in the diet, the general conclusions of the report would not be affected. In 1960, however, it is intended to carry out a limited number of assays of meat to check the overall estimate.

Strontium[90] values for eggs, potatoes, leafy brassicas, tea, and cereal infant foods are recorded. The ratio of strontium[90] to calcium in wholemeal flour was appreciably higher than that in white flour.

This part of the report concluded that the content of stronium[90] in the diet of the population in general was less than one twentieth of the maximum permissible level, and the content in the diet of any large group within the general population was unlikely to have approached one-tenth of the maximum permissible level.

Part III concerns local studies in areas of the United Kingdom where the quantity of strontium[90] in the diet is likely to exceed the average due to dairy cattle being grazed on slowly growing pastures under conditions of high rainfall. It is stated that "the results confirmed expectations that the quantity of strontium[90] which enters food-chains under these conditions can be considerably greater than elsewhere. The greater deposition of strontium[90] in rainfall is particularly efficiently entrapped in the slow-growing matted pastures which are characteristic of relatively unproductive hill areas, with the result that a larger fraction of the deposit enters the diet of cattle and hence reaches the milk. Furthermore, it is known that absorption of strontium[90] from the soil can be enhanced when its content of calcium is extremely low, a condition likely to occur in these hill areas." One area in Cardiganshire had the dubious honour of showing the highest levels of strontium[90] in the milk. However, in spite of using the available data in a highly pessimistic manner, it was concluded that even in these special areas, no individual could have received more than one-tenth of the maximum permissible level for individuals, or more than one-third of the permissible level for the entire population.

This report gives an insight of the enormous amount of painstaking and thorough work being devoted to the subject. The general impression gained is that the fall-out danger showed signs of approaching an alarming level, but that this danger has now passed its peak.

* Agricultural Research Council Radiobiological Laboratory. Report No. 3 (H.M.S.O. 3s. 6d.).

Current Literature

REPORTS

East African Veterinary Research Organisation: Annual Report, 1956-57.

Although the East African Veterinary Research Organisation at Muguga, Kenya, is only a few years old it is fast acquiring an enviable status as a major research institution of international repute. The reason is readily apparent from a perusal of its 1956-57 Annual Report by the Director, Mr. H. R. Binns, C.M.G., O.B.E., M.R.C.V.S., a publication that is a model of what an annual report should be—lucid, well-balanced, informative but not overburdened with details, and, above all, readable.

The policy has been to concentrate on a few major problems rather than to spread the organisation's resources thinly over too wide a field. The results already obtained have fully justified this policy. Rinderpest and contagious bovine pleuropneumonia are subjects which have naturally been given high priority.

Another very commendable feature has been to encourage allied scientists to visit and work at E.A.V.R.O. for varying periods. Many first class workers have already taken the opportunity. Among those who attended during the period under review, for instance, was Dr. J. Nakamura, renowned for the development of lapinised rinderpest virus vaccine, who carried out work on a rinderpest complement fixation test. An important project has been the establishment of co-operative research between E.A.V.R.O. and the U.S. Department of Agriculture, a scheme that is planned to last several years. American scientists work at Muguga and the State Department also pays an annual sum for the technical and other services rendered by E.A.V.R.O. The first joint research is on African swine fever, which is the most exotic disease of pigs causing concern to North America. Research will be undertaken in future on other virus diseases.

At the beginning of 1957 the Organisation's scientific staff was at 75 per cent. of full strength, and consisted of 17 Research Officers and 12 Laboratory Technicians. Notable events were the opening of new laboratories by H.E. the Governor of Kenya and a visit by the Rt. Hon. A. T. Lennox Boyd, Secretary of State for the Colonies.

The Organisation consists of 7 main Divisions and the Report includes excellent summaries of their work under the names of the Officers who carried it out. In this connexion it is pleasant to see that the contributions made by Laboratory Technicians are recognised and acknowledged by the inclusion of their names with those of the Research Officers.

Division of Virus Diseases: The main activity was again on rinderpest. Several significant advances were made, among them the adaptation of virus to 2 new laboratory animals, the hamster and the mouse, the successful propagation of rinderpest virus in tissue cultures and the establishment of at least 3 cell lines, and the development of a rapid simple diagnostic method—the agar double diffusion precipitation test—which does not involve the inoculation of cattle.

All these have considerable potential practical value as also do the results of an extensive experiment to determine the duration of the passive immunity of calves born of rinderpest-immune dams. By means of a serum neutralisation test and reactions to R.A.G. virus it was demonstrated that whereas calves born of rinderpest-susceptible dams could be satisfactorily immunised as young as 1 day old, calves born of immune dams and therefore carrying maternally derived rinderpest antibodies, could not with certainty be successfully immunised until they were 8 months old. This finding is of considerable interest and value where mass immunisation campaigns are planned, especially in areas where all the adult stock are immune and vaccination is confined to the annual calf crop.

The work on rinderpest propagation in tissue cultures is of great interest, especially in its possible practical applications; for example the development of a simple cheap quantitative serum neutralisation test and the production of a new attenuated virus vaccine. Other viruses grown in tissue cultures were those of African swine fever, Rift Valley fever, sheep pox and vaccinia.

The Rinderpest Vaccines Section of the Division produces all rinderpest vaccines used in East Africa and in several other territories. Approximately 4 million cattle doses of K.A.G. and lapinised vaccines are required annually.

Division of Bacterial Diseases: Research was mainly on aspects of contagious bovine pleuropneumonia. As in the case of rinderpest a notable advance was the successful adaptation of the Mansi agar double diffusion precipitation test for laboratory confirmation of the disease. Besides its speed and simplicity this test has the additional advantage over cultural tests of being able to detect infection even in decomposed *post-mortem* material a fortnight old. This has obvious benefits when investigating suspected outbreaks in areas too isolated for fresh material to be obtained for cultural or serological tests.

Division of Protozoal and Arthropod-borne Diseases.

The main problems dealt with were in connexion with East Coast fever. A significant finding was that Aurofac 2A administered orally would suppress the severity of an artificially induced E.C.F. infection in susceptible calves to a mild febrile, almost undetectable, reaction but which, however, rendered the calves subsequently strongly immune to challenge a year later. The response was the same in Zebu, grade and pure-bred exotic calves and also in older susceptible grade stock. These results give promise of a practical means of immunising valuable stock against E.C.F., a matter of considerable significance in livestock improvement schemes in East Africa.

Division of Helminth Diseases: Work was mainly basic research on paramphistomes and liver flukes. Investigations were also started into bovine cysticer-

cosis, the incidence of which is high in many parts of East Africa.

Animal Production Division: This is a new Division transferred to E.A.V.R.O. in the middle of 1957 and to be responsible for all research in animal genetics, physiology and metabolism but not animal nutrition. The genetics section continued work already begun on trying to improve the productivity of beef-type Zebu cattle. A herd of Boran cattle, maintained on grass alone, is used.

A competent pathology division and a large laboratory animals section complete the Organisation. The division of deficiency and metabolic diseases was inoperative at the time of writing through lack of staff.

This excellent Report which would be of interest to all laboratory workers in the tropics, concludes with an impressive list of publications by the E.A.V.R.O. staff during the period under review.

Federation of Nigeria: Annual Report of the Federal Department of Veterinary Research for the year 1957-58.

The Nigerian Federal Department of Veterinary Research at Vom exists primarily to supply the three Regional Veterinary Departments with vaccines, to train junior staff for them, and to give them the benefit of the research it carries out. The services it offers are not, however, limited to Nigeria; other West African territories seek its aid in varying degree, either for vaccines or to train their students.

It is apparent from the Report that the Department is now faced with the same problem that has been encountered in most other Colonies on the eve of their independence—how to attract and retain expatriate officers until enough native officers are trained and sufficiently experienced to do their jobs. While it is comparatively easy to obtain local recruits adequately qualified for the lower cadres of the service it is a very different matter when it comes to finding suitable African candidates for the higher professional and technological grades which need high initial academic qualifications and long periods of training. In the past, too, a veterinary career does not appear to have attracted many Nigerians.

Because of recruitment difficulties the Department's establishment of qualified senior staff during the year was nearly one third under strength. Consequently progress in some fields of the Department's work was inevitably slowed down. Nevertheless essential services were well maintained and, in some instances, even expanded. Particular attention was paid to the training of African Laboratory Technicians; the results were so encouraging that the filling of all the technological posts in the Department with Nigerians is now within the foreseeable future.

The Divisions of Virology and Bacteriology were engaged chiefly in vaccine production, research being severely restricted by staff shortage. The manufacture of dried goat rinderpest virus (1½ million doses issued) was a major activity. A certain amount of dried lapinised rinderpest virus was also produced; a small trial with chick embryo extract as a diluent for this vaccine instead of the usual defibrinated blood from infected rabbits seemed to indicate that better keeping qualities were obtained. Trials were also undertaken with an avianised strain of rinderpest virus introduced by Dr. J. Nakamura, F.A.O. Expert on Rinderpest. The Damascus strain formerly tried was dropped.

Nearly ½ million doses of Newcastle disease vaccine (Komarov strain) were issued between Nigeria, Ghana, and Sierra Leone. This strain has given good results, with few adverse reactions, under West African conditions.

Rabies was diagnosed on 21 occasions. A few bat brains were examined with negative results.

Bacterial vaccines issued included blackquarter (nearly 2 million doses), anthrax, haemorrhagic septicaemia, fowl typhoid, fowl cholera, contagious abortion S19, and contagious bovine and caprine pleuropneumonia.

Investigations were continued during the year into the use of a dried contagious bovine pleuropneumonia vaccine. Although it was shown that a desiccated product in adequate dosage will protect against subcutaneous challenge with virulent tissue fluid several features require further evaluation.

Animal Production Division. Work by this Division included helminthological surveys, investigations into the rôle of helminths in the causation of wet season unthriftiness in young stock, and studies on strongyles and liver flukes. In one experiment the administration of hexachloroethane, although reducing the *Fasciola* egg counts to nil, failed to produce any appreciable improvement in milk yield, bodyweight or health of fluke-infested stock in comparison with untreated controls.

Other sections of the Division conducted work on cattle blood groups, biochemical surveys, and bone analysis.

At the Livestock Investigation Centre, herds of 200 White Fulani cattle and 50 Friesian and Zebu crosses were maintained, along with some 80 Large White pigs and 30 sheep. Johne's disease was detected in the cattle for the first time; all animals positive to the complement fixation test were culled.

Veterinary Training Division. In order to meet the increasing emphasis on Nigerianisation the Department expanded its training programmes. Besides training veterinary assistants—there were students from Nigeria, Ghana, Sierra Leone, Liberia, and Ethiopia, during the period under review—the Department also conducted courses to enable Nigerians to take the Intermediate and Associate examinations of the Institute of Medical Laboratory Technicians. Suitable candidates are usually sent to the U.K. to complete their training.

The final section of the Report deals with the Lagos Veterinary Division, which, although small, has several important responsibilities including veterinary control of all animal imports into and exports from Lagos Colony. Over 10,000 cattle were exported to Ghana. Rabies continues to be a problem in Lagos but despite propaganda arouses little public concern; only 310 dogs were presented for vaccination.

The Report, a concise and comprehensive account

of the Department's activities by its Director, Dr. J. I. Taylor, Ph.D., B.Sc., M.R.C.V.S., carries a foreword by the African Minister of Research and Information, in which he succinctly summarises the position when he says "In spite of staff shortages the Department has maintained its valuable work and kept well ahead with its development projects, but it is imperative that the staffing position should be improved quickly if the many animal health problems of the country are to receive early attention."

ABSTRACTS

Oral Treatment of Spontaneous Ringworm in Cats with Griseofulvin. KAPLAN, W., & AJELLO, L. (1959). *J. Amer. vet. med. Ass.* **135**, 253.

The authors describe in detail the successful treatment with griseofulvin of spontaneous ringworm caused by *Microsporum canis* infection in 22 cats aged between 1 month and 4 years. The disease had been present for several years on the premises where the cats were housed. Griseofulvin was given orally at a dosage rate of 60 mg. daily to cats 3 months of age and over (40 mg. daily to two 1-month-old kittens).

Of the 18 cats showing lesions prior to treatment, 10 were clinically normal within 3 weeks, 6 at the end of 4 weeks, and 2 at the end of 5 weeks. Although griseofulvin produced rapid clinical recovery, most of the cats treated remained infected (culturally positive) for a much longer period. The danger to humans of infected cats showing no lesions is stressed. Complete loss of infection was achieved more quickly during therapy by clipping off all hair which fluoresced under Wood's lamp, by dipping in a 1 : 200 solution of 45 per cent. technical captan powder, or by washing with a naphthalene soap.

Ringworm lesions did not spread, nor did new lesions develop during the course of treatment with griseofulvin. Toxicity of this drug for cats appears to be very low ; only 1 cat developed a possible side-reaction (generalised pruritus) during treatment which disappeared spontaneously in 3 days without interruption of therapy. A. I. W.

The Sensitivity to Chemotherapeutic Agents of Salmonellae Isolated from Pigs. Williams Smith, H. (1960). *Res. vet. Sci.* **1**. 182.

One hundred and six strains of salmonellae isolated from British pigs in 1958 and 1959, 35 being *Salmonella cholerae-suis* and 20 *S. typhimurium*, were tested for sensitivity to antibiotics. All except one were sensitive to oxytetracycline, streptomycin, neomycin, chloramphenicol, and furazolidone ; the exceptional strain was partly resistant to furazolidone. Twenty of these strains were also tested against polymixin B and nitrofurazone. They were all sensitive to polymixin B but one of them, the partly furazolidone-resistant strain, was also resistant to nitrofurazone.

It is concluded that the widespread use of tetracyclines in pig feeding and the use of antibiotics in general in therapy and disease had had no pronounced effect in increasing the incidence of antibiotic-resistant strains of salmonellae in the British pig population. H.W.S.

Spraying of Cattle with Systemic Insecticides as a Means of Warble Fly Eradication. Rosenberger. G. (1959). *Dtsch. tierarztl. Wschr.* (Translated title.)

Two systemic phosphorus compounds, Neguvon (L 13/59 Bayer) and Asuntol (21/199 Bayer) were used in a large-scale field trial against the migrating stage of warble flies on 2921 animals. Neguvon was given orally or applied as a whole body spray at 5 to 10 atmospheres pressure, while Asuntol was either sprayed or washed into the skin. A single spray with Neguvon as a 2 per cent. solution resulted in a decrease of 95 to 97 per cent. warble infestation compared with untreated controls, *i.e.* the effect was nearly the same as the thrice repeated oral treatment. Both the oral and spray methods are suitable for inclusion in a warble fly eradication programme. Apart from temporary upsets of the digestive system which disappeared after 24 hours, the use of the Neguvon preparation as a 2 per cent solution only produced ill-effects in two animals in which spinal paralysis occurred associated with dead larvae in the spinal cord. In north German districts December, January and February are unsuitable for treatment. Results obtained with Asuntol were in comparison poor (35 to 85 per cent.). A. D. W.

A Study of the Metastabe Distribution of Erlich Ascitic Tumour Cells in Mice. SELECKI, E. E. (1959). *Aust. J. exp. Biol. med. Sci.* **5**. 489.

Erlich ascitic tumour cells were labelled with radioactive chromium and then injected intravenously into mice. The fate and distribution of these tumour emboli were then determined by measuring the radioactivity of various organs at different time intervals.

In these experiments there was a rapid removal of the tumour cells from the blood and a corresponding rise in the number lodged in the lungs. There was a constant release of tumour cells from the lungs and after 24 hours only 5 per cent. of the number of cells accumulated remained in the lung. The liver accumulated about 20 per cent. of the total number of cells infected in the first 6 hours. There was a steady accumulation of tumour cells in the spleen.

These investigations suggested that at least 3 factors were involved in this tumour growth of metastases in mice : (1) the distribution of the tumour cells to the various organs, (2) the ability of the cells to implant themselves, and (3) the ability of the cells to grow in the new environment. A. R. J.

Antirabic Vaccine from the Buffalo Calf's Brain. D'LINSA, D. S. (1960). *Indian vet. J.* **37**. 47.

The chief advantage of this method of production is one of cost which should commend itself to those countries where buffalo calves are easily obtained, and large quantities of vaccine are required. R. A. H.

Equine Sensory Ataxia ("Wobbles") Clinical and Pathological Observations in Australian Cases. STEEL, J. D., WHITTEM, J. H., & HUTCHINS, D. R. *Aust. vet. J.* **35**. 442.

Investigations were carried out by the authors on 15 clinical cases of a disease in Australian horses

apparently identical with that described in the U.S.A. as "Wobbles." The horses were of various breeds including Thoroughbreds and a *post-mortem* examination was carried out on 11 of the cases seen. The clinical histories all had certain factors in common, the onset of symptoms being always under 3 years old and frequently soon after weaning. In some, symptoms were sudden in appearance, but in most they were insidious, and frequently they were precipitated by some traumatic episode such as casting.

The symptoms consistently observed were associated with paresis and sensory ataxia, showing dragging the toes, stumbling, and general errors in the rate, range, force, and direction, of movement of all 4 limbs, resulting in swaying and difficulty in balancing. The symptoms disappeared partially if the horses were excited, but became worse if the horses were blindfolded. In all cases, temperature, pulse, respiration, mucous membranes, appetite, and blood analyses, were normal.

Post-mortem examinations revealed marked lesions in the articular processes of some of the cervical and first few thoracic vertebrae and occasionally there was stenosis of the spinal cord—fracture of cervical vertebrae and injury to neck muscles were seen but these were thought to be traumatic in origin. There was a focus of myelomalacia in the spinal cord of 1 horse. In the majority of cases the spinal cord was found to have lesions at various levels. These comprised swollen axis, cylinders, ballooning of myelin sheaths, vascularisation, and cellular accumulations. The lesions were mainly in the dorsal columns and the white matter of the cords.

There were, in 8 cases, multiple focal sub-serous lesions of the intestines which were probably incidental but which were unique in appearance and one of which contained a specimen of *Strongylus vulgaris*.

The aetiology of the condition is not considered to be hereditary nor traumatic in origin. It is postulated that the disease is due to a primary neurological disorder and that this could be responsible for abnormal posturing and consequent osteoarthropathy of the cervicular articular processes. The neurological disorder is likely to be the cause rather than the result of the traumatic lesions which were found.

The origin of this neurological disturbance is, as yet, unknown, but it is possible that it may be related to the ingestion of a neurotoxin, an antivitamin, or an antimetabolite, during a critical growth period. It is considered unlikely that it is a simple dietary deficiency.

U. L.

Value of a Large Dose of Antitoxin in Clinical Tetanus. BROWN, A., MOHAMED, S. D., MONTGOMERY, R. D., ARMITAGE, P., & LAURENCE, D. R. (1960). *Lancet*. **2 (1960).** 227.

In 1955 Wilson and Miles made the statement "Whether or not antitoxin is of any value in man given subsequently to the development of tetanus is a question that has received no definite answer." Most animal experiments have been associated with the injection of tetanus toxin and therefore differ from the naturally occurring clinical disease. Turner (1958) using the method of infecting animals with tetanus spores suggested that antitoxin may prolong life rather than prevent death.

It is recognised that physicians have long been convinced of the great efficacy of antitoxin in preventing tetanus, but many are not impressed by its ability to preserve life once the disease is clinically evident.

Although toxin already in the central nervous system cannot be neutralised by antitoxin, there is also for a time toxin in the blood, lymph, and tissues, which may be neutralised by antitoxin given promptly and so prevented from reaching the central nervous system. So the combination of chemotherapy (antibiotic therapy) with the use of antitoxin may stop the production of more toxin and neutralise any in the general circulation preventing it reaching the central nervous system.

There are parts of the world where tetanus is common but where tetanus antitoxin is not used in all cases. The reasons for not using antitoxin in all cases are that the worth of the remedy is considered unproved and adequate supplies of antitoxin are not always available. These circumstances provided an opportunity of testing whether the mortality rate of patients with tetanus receiving a large dose of antitoxin differed from those receiving none. The dose of tetanus antitoxin chosen for adults was 200,000 I.U. The patients were treated in Ibadan and Jamaica, and the design of the trial and analysis of results was done in London.

A total of 41 patients received antitoxin and 38 patients did not receive antitoxin. In the group receiving antitoxin there were 20 deaths (49 per cent.); in the group receiving no antitoxin there were 29 deaths (76 per cent.).

These results were studied from the angle of the prognostic grouping of the patients at the time of admission to the trial. In group I with the poorest prognosis the mortality rates were 71 per cent. and 85 per cent.; in group II 22 per cent. and 55 per cent.; in group III with the lowest expected mortality the results were 50 per cent. and 100 per cent., but the numbers involved were only 2 patients and 1 patient respectively.

When the results of the 3 groups were averaged out, the mean difference was found to be 20 per cent. with a standard error of 10 per cent.—a result that is just significant at 5 per cent. level. It is concluded that there is a substantial degree of evidence that antitoxin reduces mortality.

References

TURNER, T. B., VELASCO-JOVEN, E. A., & PRUDOVSKY, S. (1958). *Bull. Johns Hopk. Hosp.* **102.** 71.

WILSON, G. S., & MILES, A. A. (1955). "Topley and Wilson's Principles of Bacteriology and Immunity." Vol. 2. P. 1,971. London.

Sheep as a Potential Reservoir of Toxoplasma for Man. GARNHAM, P. C. C., & LAINSON, R. (1960). *Lancet*. **2 (1960).** 71.

Sheep have been incriminated as a source of *Toxoplasma gondii* on several occasions recently. The rôle of mutton in transmitting the disease to man

has been little considered, however, while the actual course of infection in sheep has not been related to edible material. Accordingly experimental toxoplasma infections in sheep were studied.

The toxoplasma strain used was one isolated from naturally infected sheep that was known to give rise to chronic symptomless infections in sheep and mice.

The 6 experimental animals were 10-week old "Dorset shorthorn" lambs. They were housed in fully enclosed concrete pens and were given a "balanced standard diet without grasses." Serum specimens from the animals were tested by the Sabin-Feldman reaction for toxoplasma. One animal was kept as a control in complete isolation from other sheep.

The inoculum used for the other 5 animals was a suspension of brains from mice infected with the sheep strain 6 weeks previously. One sheep received 3.5 ml. of the brain suspension intraperitoneally, 2 sheep received the same dose intravenously, 1 sheep received the dose by mouth and in the 6th sheep 3 ml. of the suspension diluted to 50 ml. was sprayed into the throat, spraying continuing for 4 minutes. The sheep inoculated intraperitoneally, the 2 sheep inoculated intravenously and the sheep dosed by spraying the throat promptly developed antibody titres. The control sheep showed no significant rise in titre and the lamb fed the inoculum showed only slight and transient rise in titre.

Toxoplasma was isolated 24 and 79 days after infection from muscle biopsy specimens from sheep II (intraperitoneal infection), sheep III and IV (intravenous infection). Toxoplasma could not be isolated at these times from the muscle of sheep VI (throat spray infection), but was found on slaughter after 112 days. Toxoplasma infection was isolated from other tissues from sheep II, III and VI after slaughter as follows:—

Sheep II. Brain, skeletal muscle, heart-muscle, liver.

Sheep III. Brain, skeletal muscle, heart-muscle, kidney.

Sheep VI. Brain, skeletal muscle.

The hazard that undercooked meat might prove a source of infection was then investigated. A whole leg of mutton from sheep III was cooked for 40 minutes in an electric oven at a low temperature. When cut the flesh near the bone was uncooked though hot. Toxoplasma could not be isolated from this uncooked though heated flesh, though toxoplasma could be isolated from unheated muscle from the same animal. It would thus appear that even gross undercooking kills the organism, and so in the ordinary way eating infected meat does not constitute a hazard to man in this country.

G. F. B.

Evaluation of a Drug for Dermatoses. WENGER, J. B. (1960). *Vet. Med.* **55.** 55.

It is postulated that the known beneficial effect of thiocyanates in the treatment of skin diseases of animals would be increased, by virtue of greater penetration, if applied in combination with triethanolamine. A report is given of the results using such a preparation (applied in a specified manner) to a variety of skin conditions in dogs and cats, including demodectic, sarcoptic, and otodectic manges; allergic reactions, mycotic infections, and "non-specific dermatoses." Although it is stated that 224 cases were concerned, the only results given are for 13 dogs and 2 cats. These are presented in table form in some detail but there is no indication whether they represent typical response or the most unequivocal responses. The results are impressive, especially those for demodectic mange.

In discussing the advantages claimed for the preparation over existing therapeutic shampoos, emphasis is laid on its lack of toxicity systemically, locally, and to the animal attendant.

This is a trial of an interesting drug but the true evaluation of this preparation is impossible on the results as presented, and must await further work.

R. J. F.

AUTUMN BOOKS

The Current Literature section of THE VETERINARY RECORD will next week once again be larger than usual. It will include reviews of a number of books we have received during the Summer, of interest both to the veterinarian in practice and to the research worker.

News and Comment

DANISH VETERINARY ASSOCIATION ANNUAL MEETING

The Annual General Meeting of the Danish Veterinary Association was held in Helsingor on September 10th and 11th. The President of the B.V.A. and Mrs. Jennings were the guests of the Danish Veterinary Association and they received warm hospitality during their stay in Denmark. The meetings and social events took place in one of Denmark's most comfortable hotels situated in lovely grounds and overlooking the Kattegat at its narrowest point. The President, Dr. K. Seidel, occupied the chair. Several papers were read including one by Professor W. E. Petersen of Minnesota on "The Production of Antibodies in the Mammary Gland." The guests were entertained at the Annual Banquet and Dance and also at a number of luncheons, both in Helsingor and in Copenhagen. The whole of the proceedings was enhanced by a period of perfect weather.

THE REGISTER OF VETERINARY SURGEONS

Mr. Basil Arthur Matson, B.V.SC. (PRETORIA), London House, Guildford Street, London, W.C.1, was registered in the Commonwealth List of the Register of Veterinary Surgeons on September 20th, 1960.

HISTORY OF THE R.A.V.C.

The following additional donations have been received:—

Captain Ivor Hughes, £5.
Glaxo Laboratories Ltd., £50.
Radiol Chemicals Ltd., £10 10s.
Imperial Chemical Industries Ltd., £10.
Allen & Hanburys Ltd., £25.

B.V.A. CONFERENCE ON HYPOMAGNESAEMIA

Members of the profession who may be attending the conference from outside London, and who will want hotel accommodation, are reminded that such accommodation may not be easy to obtain unless bookings are made in good time. Additionally, it would help the administrative staff at B.V.A. headquarters if members would be good enough to send in their applications for places at the conference as early as possible.

PERSONAL

Mr. N. M. Black, Veterinary Adviser to Messrs. Boots Pure Drug Company since 1947, has taken up a new post with the Pharmaceuticals Division of Messrs. Imperial Chemical Industries at Fulshaw Hall, Wilmslow, as from October 3rd. Mr. Black has been honorary secretary of the East Midlands Division for almost 5 years, a past President of the Division, and a member of Council, B.V.A.

Births

JANES.—On September 15th, 1960, to Shirley (*née* Young), wife of Peter Janes, B.V.SC., M.R.C.V.S., of Shirley, Solihull, Warwicks., a daughter, Joanna Karen.

SEBESTENY.—On September 18th, 1960, to Susan (*née* Halls), wife of Andor Sebestény, B.V.SC., M.R.C.V.S., of Thornbury, Nr. Bristol, a daughter, Nicola.

Marriages

HARDY—DODD.—On September 10th, 1960, at St. Mary's Church, Grassendale, Liverpool, B. D. W. Hardy, B.V.SC., M.R.C.V.S., of Sutton Bonington, Loughborough, to Margaret Dodd of Cressington Park, Liverpool.

SMITH—FFOULKES.—On Saturday, September 24th, 1960, at St. Oswald's Church, Norbury, S.W.16, J. S. Smith, B.VET.MED., M.R.C.V.S., of Uphill, Weston-super-Mare, to Heather Ffoulkes of Beulah Hill, S.E.19.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

REID, George McLean, of Reading, Berkshire. Graduated Edinburgh, December 13th, 1949. Died September 18th, 1960, aged 34 years. Members of the profession may have read in the newspapers that Mr. Reid was drowned in trying to save his wife who had got into difficulties while bathing. She was rescued by a 15-year-old boy.

COMING EVENTS

October

12th (Wed.). MIDLAND COUNTIES VETERINARY ASSOCIATION AND SOUTH EAST MIDLANDS VETERINARY ASSOCIATION. Dinner-Dance at the Hotel Leofric, Coventry, 8 p.m.

CORNWALL VETERINARY CLINICAL CLUB. Meeting at the Royal Hotel, Bodmin, 7.30 p.m.

13th (Thurs.). YORKSHIRE VETERINARY SOCIETY. Annual Dinner-Dance at the Cairn Hotel, Harrogate, 8 p.m.

15th (Sat.). B.S.A.V.A. NORTH WEST REGION. Meeting at the Bull and Royal Hotel, Preston, 8 p.m.

18th (Tues.). MID-WEST VETERINARY ASSOCIATION. Dinner-Dance at the Berkeley Café, Clifton, Bristol.

19th (Wed.). SUSSEX VETERINARY SOCIETY. Meeting at the Dudley Hotel, Lansdowne Place, Hove, 2.30 p.m.

SOUTH EASTERN VETERINARY ASSOCIATION. Meeting at the Royal Star Hotel, Maidstone, 2.30 p.m.

20th (Thurs.). SOCIETY OF WOMEN VETERINARY SURGEONS. Autumn Meeting at the Department of Veterinary Surgery, University of Bristol, Langford, Somerset, 2 p.m.

WEST OF SCOTLAND DIVISION. Extraordinary general meeting at the University Veterinary Hospital, Bearsden Road, Bearsden, 7.30 p.m.

ESSEX VETERINARY SOCIETY. Meeting at the Saracen's Head Hotel, Chelmsford, 7.30 p.m.

21st (Fri.). SCOTTISH METROPOLITAN DIVISION. Annual Dinner-Dance at the Carlton Hotel, North Bridge, Edinburgh, 8 p.m.

26th (Wed.). WELSH BRANCH. Meeting at the Belle Vue Hotel, Aberystwyth, 2.15 p.m.

27th (Thurs.). SOCIETY FOR THE STUDY OF ANIMAL BREEDING. Meeting at 1, Wimpole Street, London, W.1, 11.30 a.m.

28th (Fri.). SOUTH WALES DIVISION. Annual Dinner-Dance at the Park Hotel, Cardiff, 8 p.m.

YORKSHIRE VETERINARY SOCIETY. Meeting at the Royal Station Hotel, York, 2.30 p.m.

November

11th (Fri.). V.V.B.F. NORTH OF SCOTLAND DIVISION. Annual Dinner-Dance in the Northern Hotel, Aberdeen, 7.30 p.m.

December

2nd (Fri.). NORTH OF ENGLAND VETERINARY MEDICAL ASSOCIATION. Annual Dinner-Dance at the White Swan Hotel, Alnwick.

B.V.A. COMMITTEE AND COUNCIL MEETINGS

Tuesday, November 15th, at 7, Mansfield Street
5 p.m. Finance Sub-Committee.
Wednesday, November 16th, at 7, Mansfield Street
10.30 a.m. Small Animals Committee.
12 noon Parliamentary and Public Relations Committee.
2.15 p.m. Veterinary State Medicine Committee.
4 p.m. Home Appointments Committee.
Thursday, November 17th, at 7, Mansfield Street
10.30 a.m. Farm Livestock Committee.
2.15 p.m. General Purposes and Finance Committee.
Friday, November 18th
10.15 a.m. Council Meeting in the Connaught Rooms, Great Queen Street, London, W.C.2.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Foot-and-Mouth Disease

Beds. Willoughby Farm, Great Barford (Sept. 30); Scotts Meadows, Great Barford (Oct. 1); Village Farm, Moggerhanger; Long, Meadow, Blunham (Oct. 2).
Yorks. Tevent Farm, East Keswick, Leeds (Oct. 1).

Fowl Pest

Dorset. Duncliffe, Verwood Road, Three Legged Cross, Verwood, Wimborne; Raglans Farm, Kingstag, Sturminster Newton (Sept. 27); Pleck Farm, Haselbury Bryan, Sturminster Newton; Halbrook Farm, Lydlinch, Sturminster Newton (Sept. 28); 9, Duntish View, Pulham, Dorchester; Keith Acre, Crab Orchard, Three Legged Cross, Verwood, Wimborne (Sept. 29).
Essex. Maldon Hall, Maldon (Sept. 27); Butts Green, Sandon, Chelmsford (Sept. 28); Bloomfield Farm, Long Road, Dedham, Colchester (Sept. 30).
Hereford. Cawardine Farm, Madley (Oct. 1).
Lincs. 79, Moor Lane, North Hykeham (Oct. 2).
Salop. Bentley House, Clungunford, Craven Arms; 2, Church Road, Clungunford; Craven Arms (Sept. 28).
Warwicks. 605, Stratford Road, Shirley, Solihull (Sept. 29); 5, Bell Lane, Northfield, Birmingham (Oct. 1).

Swine Fever

Anglesey. Fferm Gorniog, Pentraeth (Sept. 28).
Durham. Gallows Hill Road, Boldron, Barnard Castle (Sept. 30).
Hants. The Chantry, Foxbury Lane, Westbourne, Emsworth (Sept. 29).
Lancs. Yew Tree Farm, Davyhulme Road, Davyhulme, Urmston, Manchester (Sept. 27); Cooksons Farm, Ashton Heath, Ashton-in-Makerfield, Wigan (Sept. 28).
Leics. Manor Farm, Middleton, Market Harborough (Sept. 28).
Lincs. Pear Tree Farm, Friskney, Boston (Sept. 29); Yondar, Legbourne Road, Louth (Sept. 30).
Middlesex. Brockley Hill, Stanmore (Sept. 30).
Norfolk. Decoy Farm, Potter Heigham, Great Yarmouth; Whitehouse Farm, Freethorpe, Norwich (Sept. 30).
Salop. 8, Snailbeach, Minsterley, Shrewsbury (Sept. 27); Hoyston Mill, Minsterley, Shrewsbury; The Fold, White Gritt, Minsterley, Shrewsbury (Sept. 30).
Staffs. Weston Cottages, Standon, Stafford (Sept. 27).
Suffolk. Ponda Cottage, Conyers Green, Gt. Barton, Bury St. Edmunds (Sept. 30).
Worcs. Pear Tree Farm, Norton (Sept. 30).
Yorks. Colton House Farm, Lower Dunsforth, Boroughbridge (Sept. 27).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Diagnosis of Suspected Actinobacillosis

Sir,—I am investigating the serological response of cattle to infection with *Actinobacillus lignieresi* and the results so far obtained with a few animals suggest that the agglutination test may be a useful aid to diagnosis in cases of suspected actinobacillosis, particularly of the alimentary tract. A more extensive survey of known clinical cases is necessary, however, and I would welcome co-operation from any members of the profession who would be willing to supply material for examination from clinical cases of wooden tongue, or from cattle suspected of being affected with actinobacillosis of other organs.

The materials which would be required are:—

(a) a clotted blood sample taken before treatment is begun and

(b) a swab from the affected tongue.

It would be desirable also to have another blood sample when the animal had recovered.

A supply of containers and sterile swabs can be arranged for anyone who is willing to help.

Yours faithfully,
J. E. PHILLIPS.

Department of Veterinary Bacteriology,
Royal (Dick) School of Veterinary Studies,
Edinburgh, 9.

September 30th, 1960.

The Colonial Veterinary Service

Sir,—I write with reference to the leading article in your issue of July 9th, 1960, and would ask for space to express the personal views of a veterinary surgeon in the Research Branch of Her Majesty's Oversea Civil Service. To avoid any necessity for reference to the Veterinary Register, my sole paper qualification is Membership of the Royal College of Veterinary Surgeons.

Your readers may have the impression, if they had only read your comments, that the outstanding grievance of colonial veterinary officers is that they are not accorded four salary increments for approved post-graduate qualifications. They might also infer that there exist a considerable number of individuals who resent bitterly the fact that "a veterinarian holding the Diploma in Bacteriology is four increments behind a medical doctor working side by side with him having the same qualification." It is stated categorically that the refusal of the Colonial Office to grant salary increments for post-graduate qualifications, gained after joining the service, is absurd.

I consider it desirable to give expression to other opinions, in order that these, too, may reach the Salaries Commission which is at present inquiring into conditions of service in the East African territories. Firstly, nobody within the service can complain that proper recognition should be given to

post-graduate qualifications or similar specialised experience acquired prior to joining the Colonial Service. In the great majority, if not all instances, such recognition is given, and of course the individual is free to accept or reject the terms of service offered. But when such "higher qualifications" have been obtained as the result of taking extended leave of absence from understrength establishments, is it really so absurd that the individual is required to return to duty minus four increments? During these study periods the candidate receives full rates of salary which must be the envy of any non-colonial aspirant, who meanwhile has to support himself in the United Kingdom, or elsewhere. If four salary increments were to be granted for the successful outcome of each such well-paid studentship, I can imagine that Directors would be inundated with requests for study leave, and a majority of these would perforce have to be turned down, resulting in many permanently disgruntled officers.

Secondly, although "specialised knowledge" may undoubtedly be of value both to the employing authority and to the employee, what possibilities exist at present for a veterinarian, or anybody else, to acquire a "recognised" post-graduate qualification in such subjects as animal husbandry, helminthology, protozoology, biochemistry or pathology within the compass of, say, 9 to 12 months? The latter period is the maximum which appears to be accepted by Colonial Governments for such courses of instruction. Your leading article then, in effect, proposes to grant considerable advantages to those colonial research workers, and only those who aspire to become bacteriologists or, possibly, virologists. From the point of view of the field officer in the Colonial Veterinary Service, what higher qualifications are to be envisaged, which really justify the grant of four salary increments? Perhaps the D.V.S.M., D.T.V.M. or F.R.C.V.S. could be graded down to the value of one or two increments worth, say, £50 to £100 per annum in hard cash, compared with the proposed £150 to £200 per annum for the Dip. Bact. Should this sound a little disrespectful I would refer your readers to advertisements, recently appearing in THE VETERINARY RECORD, for veterinary officers in the Ministry of Agriculture, Government of Northern Ireland. These state that the "commencing pay may be increased by one increment for holders of the D.V.S.M. or equivalent post-graduate diploma."

Our profession has no equivalent for the M.R.C.P., F.R.C.P. or F.R.C.S. qualifications which enable clinical specialists in medicine to keep pace with their fortunate colleagues possessing the Dip. Bact., etc. I personally am not so much interested in what is earned by the "medical doctor working side by side," for these persons do not, literally, exist. I suggest that it is far more important for the B.V.A. to continue to press for rates of salary for *all veterinarians* in the Colonial Service which compare favourably with those which may be earned in private veterinary practice, in the U.K. Ministry of Agriculture, in commerce, and in the Universities, plus consideration for the insecurity of present-day colonial employment. If these were to be granted, nobody could legitimately complain about the salaries of medical bacteriologists.

Continual reference to parity with the medical profession neither becomes us nor, I am sure, favours our case with salaries commissions. More importantly, I know that there are amongst us here, in East Africa, waverers who would propose to surrender the present differential rates for our profession, these being considerably in our favour, and substitute a system of four increments for a Dip. Bact., Ph.D., etc., in general scientific officer scales. This attitude leaves out of account the basic consideration that salaries for veterinarians in the Colonies are still correctly and most immediately related to what our graduates can command in private practice, which absorbs the overwhelming majority, and not to the persistence of individuals in acquiring post-graduate qualifications after their arrival overseas. Here, surely, we can learn from what many choose to call the "sister profession." We must not nonchalantly surrender our present favourable position, gained by such great efforts on the part of our professional associations, for the doubtful and non-financial benefits of integration into a general scientific service.

In conclusion, may I suggest that in choosing "Extra Salary Increments for Higher Qualifications" as one of the most important "Anomalies in the Colonial Service," you have glossed over the insecurity of our future employment, and our pensions, leaving out of account any compensation for possible loss of office. You have also indicated a degree of professional specialisation which has seldom existed here in the past, and as far as can be seen, has an extremely doubtful future.

Yours faithfully,
W. PLOWRIGHT.

E.A. Veterinary Research Organisation,
P.O. Box 32,
Kikuyu,
Kenya.
August 23rd, 1960.

Sir,—I refer to Mr. W. Plowright's letter published above in which surprise is expressed that the leading article referred to confines itself to lack of official recognition of higher qualifications. This leading article was written in response to several expressions of dissatisfaction on the particular subject of financial reward for higher qualifications. The comments came from the Kenya Veterinary Association, of which Mr. Plowright is a member.

It was never intended to set forth the principal grievances of veterinary surgeons serving overseas, and there seems little reason why your readers should gain the impression that "the outstanding grievance of Colonial Veterinary Officers is that they are not accorded four salary increments for approved post-graduate qualifications."

The leading article did not state literally that "the refusal of the Colonial Office to grant salary increments for post-graduate qualifications, gained after joining the service, is absurd." The point at issue was that it was absurd such awards should be refused on the grounds that they were gained *only after joining the Service*.

Whether or not it is appropriate for extra salary

increments to be awarded as a result of the acquisition of higher qualifications during study leave, the whole point of the leading article was to draw attention to the anomaly, now admitted by the Secretary of State, wherein medical officers are rewarded whereas veterinary officers are not. There have been instances where members of the two professions have studied side by side on the same post-graduate course, returned to the same Colony, and pursued strictly comparable projects of research in their respective laboratories separated by only a few miles.

The Overseas Committee, and the Officers of the British Veterinary Association, are acutely aware of the anxiety of veterinary surgeons employed and in practice Overseas. It is quite wrong to suggest that such major points as insecurity of employment, pensions, and compensation for possible loss of office are being "glossed over." These and other items are receiving most earnest attention, and considerable effort has already been expended in supplying the East African veterinary associations with facts, figures and suggestions for use in their discussions with the Salaries Commission. In addition the B.V.A. is addressing the Commission direct, conveying to the Chief Secretaries of a number of other territories the Association's deep concern over the present unsatisfactory terms and conditions of service, and offering recommendations for improvement.

Yours faithfully,
S. E. PIERCY,
Chairman, Overseas Committee.

B.V.A.
7, Mansfield Street,
London, W.1.
September 20th, 1960.

An Outbreak of Trichomoniasis

Sir,—I should like to report an outbreak of trichomoniasis in Durham County.

A client runs 2 herds on his farm, a Red Poll herd for milk, and a herd of Shorthorns and cross Aberdeen Angus running with Aberdeen Angus bulls for breeding beef calves. In the spring of 1959 he purchased a bunch of Irish heifers to run with Angus bulls. Three or 4 of these heifers turned out to be already in calf. One of his Angus bulls became lame and was unfit for service, so to avoid having to purchase another, he turned out one of his Red Poll bulls with the Irish heifers. This bull returned to the Red Poll herd in October.

In April of this year there was evidence of breeding troubles in the Red Poll herd. Several cows served by this bull in November, December, and January were returning to service after 3 or 4 months. A pregnancy check showed that none of his cows were pregnant and several showed varying degrees of metritis with a muco-purulent discharge. Samples of vaginal mucus from several cows were submitted to the laboratory and reported negative for *Vibrio*, and also negative for bacteria. A further batch of samples submitted about 3 weeks later were also examined by the laboratory for *Trichomonas*, and 2 were found to be positive. This was subsequently confirmed at Weybridge.

The condition has now been found to exist in the beef herd also.

As my first investigation of the breeding trouble in this herd took place in April, that is before the reports of outbreaks of trichomoniasis were mentioned in THE RECORD about 3 weeks ago, being under the impression that the condition was extinct in this country I did not consider it as the cause of the trouble, and I would urge practitioners not to exclude this factor when faced with a breeding problem in a herd.

There is also very strong evidence that the infection in this case originated from Ireland, and it might be interesting to know if there is any evidence in the other outbreaks lately reported as to where the infection may have originated.

I would like to thank Mr. Shaw of the Veterinary Investigation Centre at Newcastle for his help and advice in this case.

Yours faithfully,
JOHN D. PEELE.

Elvet Waterside,
Durham.
September 6th, 1960.

ADVERTISERS' ANNOUNCEMENTS

"Diampron" brand amicarbalide, a new product for the treatment of bovine redwater, is now available in multi-dose containers of 50 ml. of 50 per cent. w/v solution.

EVANS MEDICAL announce that their sterile injection Carboloma may be used for the treatment of fascoliasis in cattle at a dose rate of 5 c.c. per cwt. bodyweight with a maximum of 40 c.c. The calculated dose should be divided into two parts and injected intramuscularly.

The use of Carboloma has hitherto been limited to the treatment of sheep.

It is understood that the Company welcomes requests for detailed information addressed to their Veterinary Information Department.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th Sept., 1960		4	1	6	20	—	44
Corresponding period in	1959	19	1	—	24	—	65
	1958	6	1	—	26	—	58
	1957	2	—	1	30	—	38
1st January to 15th Sept., 1960		154	1	20	1,409	—	840
Corresponding period in	1959	167	1	9	501	—	844
	1958	112	5	114	503	—	956
	1957	254	6	40	581	—	690